

JPRS-TND-89-021
6 NOVEMBER 1989



JPRS Report

Nuclear Developments

Nuclear Developments

JPRS-TND-89-021

CONTENTS

6 NOVEMBER 1989

CHINA

First Low-Temperature Nuclear Reactor Successfully Completed [LIAOWANG 31 Jul]	1
Anniversary Activities Held in 'Atomic City' [ZHONGGUO XINWEN SHE]	2
Experts Urge Greater Nuclear Power Development [XINHUA]	3

EAST ASIA

JAPAN

MSA Patrol Boats To Escort Plutonium Ships	4
Kaifu Rules Out Navy Ships [KYODO]	4
Large Patrol Boats Considered [KYODO]	4
LDP Criticizes Escort Plan [KYODO]	4
Government Decision Announced [KYODO]	4
Safety Commission Concerned About Aging N-Plants [KYODO]	5

SOUTH KOREA

Power Company To Build Nuclear Power Plants [YONHAP]	5
--	---

LATIN AMERICA

ARGENTINA

Cavallo Acknowledges Development of Rocket Technology [NOTICIAS ARGENTINAS]	6
---	---

CUBA

Atomic Energy Commission Official in CSSR [Havana Radio]	6
--	---

NEAR EAST & SOUTH ASIA

INDIA

Polar Satellite Launch Vehicle's Test Successful [Delhi Radio]	7
--	---

ISRAEL

Reactions to NBC Reports of Nuclear Ties to South Africa	7
Defense Ministry Denial [Tel Aviv Radio]	7
Sharon Statement [Jerusalem Radio]	7
HADASHOT Article [HADASHOT 27 Oct]	7
IDF Radio Report [Tel Aviv Radio]	8
Rabin Statement [Tel Aviv Radio]	8
Rubinstein Refutes Report [Jerusalem Radio]	8
Defense Ministry Denies Other Transfers [Jerusalem TV]	8
HA'ARETZ Assessment [HA'ARETZ 29 Oct]	8
Rabin Interview [Jerusalem Radio]	9
Netanyahu Interview [Tel Aviv Radio]	9

PAKISTAN

Daily Welcomes Bush Certification on Nuclear Bomb [THE MUSLIM 9 Oct]	10
--	----

SOVIET UNION

Witnesses Recall 1957 Accident at Kyshtym [PRAVDA 25 Aug]	11
---	----

WEST EUROPE

CANADA

Candu Feasibility Study Agreement Signed With Hungary [THE TORONTO STAR 27 Sep]	19
---	----

FEDERAL REPUBLIC OF GERMANY

UK Paper on FRG Assistance for Libyan Missile [London THE SUNDAY CORRESPONDENT 15 Oct]	19
Renewal of Brazilian Nuclear Treaty Opposed [DER SPIEGEL 16 Oct]	20
Employees of Major Companies Said Involved in Transfers [DIE TAGESZEITUNG 16 Sep]	22
Documents on Nuclear Scandal Leaked	23
Soviet Involvement Alleged [DIE TAGESZEITUNG 7 Oct]	23
Heavy Water Transferred [DIE TAGESZEITUNG 7 Oct]	23

FRANCE

Government Reaffirms Civil Nuclear Power Policy [AFP]	29
---	----

SWEDEN

Ruling Party Considers Future of Nuclear Power	29
Long-Term Policy Vague [DAGENS NYHETER 19 Aug]	29
Union Leaders Critical [DAGENS NYHETER 19 Aug]	30

TURKEY

Studies Under Way on Nuclear Reactor Construction [ANATOLIA]	30
--	----

First Low-Temperature Nuclear Reactor Successfully Completed

40130124x Beijing LIAOWANG in Chinese No 31, 31
Jul 89 pp 25-26

[Article by Ma Xuquan [7456 2700 3123] and Huang Wei [7806 1218]: "Exploring the Secrets of Nuclear Energy and Its Peaceful Uses—Marking Completion of China's First Low-Temperature Nuclear Heat Supply Reactor"]

[Text] How can we alleviate and solve the energy resource shortage? One new route all the world's nations are exploring is developing nuclear power. Nuclear power is the only mature substitute energy resource. In 1981, Qinghua University's Nuclear Power Technology Institute finished transforming an operational experimental swimming-pool reactor into a low-temperature nuclear heat-supply reactor [i.e., a district-heating reactor] to provide heated air to three institute structures with excellent results. This project was included in the Seventh 5-Year Plan as a "focus within a focus" project.

I.

Not long ago, the Qinghua University Nuclear Power Technology Institute reported some gratifying news: after many years of work, installation and debugging of China's first low-temperature nuclear heat-supply reactor we designed and built ourselves has been completed and the reactor is operating normally. Completing it was a breakthrough in nuclear energy and its peaceful uses in China and it has entered the ranks of advanced world standards.

China's top nuclear power expert, Wang Dazhong [3769 1129 0022], director of the Qinghua University Nuclear Power Technology Institute, introduced the situation in this area. He said that when the peaceful use of nuclear energy is mentioned, everyone thinks first of nuclear power plants. Indeed, nuclear power reactors, which have an industrial scale and bring prosperity to mankind, are mainly used to generate electricity. A new member, though, has joined the multitude of nuclear power reactors: it is the low-temperature nuclear heat-supply reactor for centralized heat supply in urban areas. Data show that compared to burning coal, nuclear heat supply has advantages like saving coal, lower cost heating, no environmental pollution, and so on. Nuclear heat supply costs 30 percent less than boiler heat supply. Moreover, compared to a nuclear power plant, a nuclear heat-supply reactor has advantages like simpler equipment, shorter construction times, smaller investment, and so on. Although there are now 30-plus low-temperature reactors in the world, most are used to generate power while providing excess heat. Over ten nations including the Soviet Union, United States, the FRG, France, England, and others have studied low-temperature nuclear heat supply but most are still in the experimental stage. Canada has completed and placed into operation a low-power, low-temperature swimming-pool nuclear heat-supply reactor. Its parameters are low

and it has not attained an industrial scale. It is apparent that international work began rather late in this area, so China may be able to catch up with advanced international levels.

China's low-temperature reactor operates at a low temperature (198°C), low pressure (15 bar), and low power density. It uses an integrated natural cycle structure, has no rotating valves, does not rely on an external power source for cooling, and so on, and it has an intermediate isolation loop, so it is simple and reliable. Deserving special mention is that the key component in this reactor, the control-rod drive system, uses a hydraulic [water-powered] drive arrangement. It is different from the electromagnetic and mechanical drive systems or hydraulic [pressurized-liquid] drive systems now used in reactors. This drive structure avoids technical problems from high-temperature, high-pressure sealing in power reactor control drives, so it has advantages like structural simplicity, safety, long life, low cost, and so on. Its application can simplify the structure of reactor tops, reduce reactor heights, and prevent nuclear leaks and other accidents.

Pointing to the design blueprint hanging on the wall, Wang Dazhong said emphatically that "after the Chernobyl Nuclear Power Plant accident in the Soviet Union, people turned colors when talking about nuclear power. Thus, the 5 MW low-temperature nuclear heat-supply reactor we designed put safety first. This 5 MW low-temperature reactor is the world's first reactor with hydraulic [water-powered] drive-control rods."

II.

Reporters were fortunate enough to see the final installation of the reactor's internal components before the low-temperature reactor was sealed.

In the reactor building, the shouted installation directions, sounds of welding sparks, and S&T personnel and laborers working on installation blended together and the tense installation work went according to procedure. Rows of several hundred uranium rods used as fuel were placed in sequence into the reactor core surrounded by cooling water. The exterior is an enormous safety pressure screen and safety vessel. The exterior of the reactor looks like a big chicken egg standing on end.

Deputy senior engineer Dong Duo [5516 6995], who was on site directing the installation, discussed the reactor construction process with the visitors. He said that construction of this experimental reactor project, which was directed by Professor Wang Dazhong, began in March 1986. Civil engineering construction was completed smoothly at the end of 1987. Installation of 17 technical systems was completed in Spring, 1989. In 3 years, instructors and employees in the Nuclear Power Technology Institute finished 13 important scientific research topics on the low-temperature nuclear heat-supply reactor, wrote a 2.5 million character installation report and related documents and submitted them to the State Nuclear Safety Administration, and used the

Changchun No 1 Automotive Works as a base point for feasibility research on a large-scale commercial low-temperature nuclear heat-supply reactor.

Final hoisting of the top seal for the reactor's internal components came on 15 April 1989. That day, institute leaders and many S&T personnel and workers went early to the reactor to prepare for installation. The precision components to be hoisted were prepared, some as heavy as 4.5 tons and some as light as silk, and there were quite a few small pipes and valves which required precision welding. Thus, lifting and installing them was very hard and not even the smallest of errors could be permitted. No one rested or ate while installing. They fought for 13 solid hours and eventually completed their tasks smoothly at 4 pm on 15 Apr 89.

III.

Research, design, construction, and installation of the 5 MW low-temperature nuclear heat-supply reactor involved the condensed blood and sweat of the over 600 instructors and employees in the Qinghua University Nuclear Power Technology Institute.

The reporters heard a moving story filled with fighting for progress and the spirit of seeking truth from science.

The infirm Wang Dazhong had overall responsibility for research on the low-temperature nuclear heat-supply reactor. He did much intensive and detailed organization and technical guidance work in the program selection and experimental construction stages. In late 1988, while participating in a discussion on S&T cooperation in West Germany, fatigue put him in the hospital with heart disease and the doctors let him rest for a month, but he went back to work after resting for just 1 day when he returned to China. At crucial times during reactor core installation, he usually ate and lived at the work site together with the workers.

Institute deputy director Lin Jiagui [2651 1367 2710] is a female comrade over 50. She spent several winter and summer holidays over the last 2-plus years working at the institute and often did not go home, staying on site with everyone day after day. During final installation work, she gave on-site direction for 48 straight hours. She lost her voice and her face was thin and pallid, but she did not rest until everyone warned her. Engineer Dong Duo, who is suffering from cancer, continued to work on the front line after two operations and threw himself into leading the S&T personnel to attack key technical problems.

Many institute S&T personnel did full-scale experiments with key equipment and technologies to complete key experiments and the construction design. For example, S&T personnel responsible for studying the control-rod hydraulic [water-powered] drive system gave up many vacations and holidays without pay for over 4 years to work overtime on building five platforms and doing cold-state and hot-state experiments and comprehensive

experiments, eventually moving this system up to advanced international levels.

Relevant experts said in evaluation that the low-temperature nuclear heat-supply reactor has vast prospects in north China. North China has 175 large and medium-sized cities which must heat more than 1.25 billion cubic meters every winter. It has been projected that with a rather long period of effort, erecting several low-temperature nuclear heat-supply reactors in north China would make the atmosphere above these cities a deep blue sea and the forests denser and more luxuriant. Nuclear power can warm people in the winter and cool them in the summer. Nuclear energy will bring substantial prosperity to the people and become an indispensable new energy resource for society. Completion of the 5 MW low-temperature nuclear heat-supply reactor is a strong first step toward this beautiful era.

Anniversary Activities Held in 'Atomic City'

HK2110023089 Beijing ZHONGGUO XINWEN SHE in Chinese 0934 GMT 16 Oct 89

[Report: "Grand Activities Were Held in the 'Atomic City' in the Western Part of China To Mark the 25th Anniversary of the Successful Explosion of China's First Atomic Bomb"—ZHONGGUO XINWEN SHE headline]

[Text] Urumqi, 16 Oct (ZHONGGUO XINWEN SHE)—At exactly 1500 today 25 years ago, China's first atomic bomb exploded over Lop Nur in the western part of China. It was the first milestone in the development of China's defense modernization. Today, grand commemorative activities are held in Malan, the "atomic city".

A person in the circle of China's science and technology for national defense pointed out: China has developed nuclear weapons completely for the purpose of self-defense and to enable the world to march toward peace. China is opposed to atomic bombs, but as Mao Zedong said, "we cannot do without them." Over the past 25 years, China has successively carried out over 30 nuclear tests in different ways and at different equivalents, such as atomic bombs, hydrogen bombs, missile-carried nuclear weapons, underground flat tunnels, and vertical shafts.

The successful experiments of various nuclear weapons over the past 20 years and more mark that the modernization of China's national defense has entered a new stage. It is also a major breakthrough in the history of China's science and technology for national defense and another milestone on the road of developing nuclear weapons through its own efforts.

This day after 25 years, we can see that where the first atomic bomb exploded, a great iron tower for installing the atomic bomb that year lay in disorder everywhere after being melted by the nuclear fire. Today, these pieces have become historic relics displayed to the later generations.

After the successful explosion of China's first atomic bomb, with the coordination of the departments concerned and in accordance with the test parameters, the technical team in charge of nuclear tests studied a series of technological and theoretical problems such as the dissemination pattern of shock waves following an atomic explosion, the phenomenon of fire balls, the distribution of light radiation, and the spread of nuclear radiation in the early stage, and thus laid a solid theoretical and practical foundation for the future nuclear experiments.

Since its organization and building 30 years ago, China's nuclear test base in Lop Nur has accumulated a lot of precious data for China to study nuclear technology and has simultaneously supplied a lot of professionals for various departments of China's economic construction. Currently, while finishing the duty of carrying out nuclear tests for the state, it has also developed some new technologies in the service of economic construction to enable atomic energy to create wealth for mankind through peaceful use.

Experts Urge Greater Nuclear Power Development

*OW1810232089 Beijing XINHUA in English
1439 GMT 18 Oct 89*

[Text] Chinese experts said here today that more efforts should be poured into developing nuclear power in southeast China, which is the biggest region of energy consumption in the country but faces a serious shortage of energy resources.

At a seminar on natural gas and nuclear power development held here today, the experts stressed the necessity and feasibility of nuclear power development in this region.

Cheng Zhaobo, deputy chief manager of the China National Nuclear Corporation, said that each region of the country should develop a different kind of energy—such as hydropower in the southwest region, which is rich in water resources, thermal power in the northeast and northwest, where most of the coal mines in the country are located, and nuclear power in the southeast region, which is short of both water and coal resources.

Now, coal makes up 70 percent of the whole country's energy consumption structure.

Recent statistics show that the southeast provinces, Jiangsu, Fujian, Anhui, Zhejiang and Jiangxi, are short of 16 billion kwh of electricity each year due to the problem of coal transportation from northeast China.

But southeast China is rich in uranium resources; nearly 100 uranium deposits and six uranium mineral areas have been discovered, and five uranium mines developed.

The experts estimated that the known uranium resources in this region could supply eight nuclear power stations with a total capacity of 10 million kw until the end of this century.

According to a plan drawn up by the Ministry of Energy Resources, China will produce 30 billion kwh of nuclear electricity at the end of the year 2000 and build more nuclear power stations in south China in addition to the Qinshan and Daya Bay Nuclear Power Stations, both of which are under construction.

JAPAN

MSA Patrol Boats To Escort Plutonium Ships

Kaifu Rules Out Navy Ships

OW1610125389 Tokyo KYODO in English
1137 GMT 16 Oct 89

[Text] Prime Minister Toshiki Kaifu on Monday ruled out the use of Maritime Self-Defense Force ships to escort plutonium shipments from Europe to Japan.

Kaifu said the government is, however, considering the possibility of using Maritime Safety Agency (MSA) vessels to escort shipments by sea.

The prime minister made the remarks at a session of the Budget Committee of the House of Representatives in response to a question posed by opposition Komeito member Yoshiaki Kiuchi.

Kiuchi was following up on comments by Defense Agency Director General Juro Matsumoto, who told reporters last Friday that the government will reassess its decision to build a new MSA ship to escort Japanese vessels carrying reprocessed plutonium from Britain and France starting in 1992.

Kaifu denied the Defense Agency chief mentioned the possibility of using Self-Defense Forces vessels.

Matsumoto made the comment in response to remarks by Kaifu at a Diet session on October 5 that the government will study the sending of the Self-Defense Forces overseas for nonmilitary purposes.

Large Patrol Boats Considered

OW2510130889 Tokyo KYODO in English
0923 GMT 25 Oct 89

[Text] Transport Minister Takami Eto on Wednesday indicated the Maritime Safety Agency (MSA) is considering building large patrol boats to escort plutonium shipments from Britain and France.

In answering questions by an opposition Diet member at a session of the House of Councillors Budget Committee, Eto said MSA patrol boats should be equipped to deal with potential hijackers of the nuclear material.

However, he did not elaborate on the nature of the proposed equipment of these escort vessels, possibly to be in service in 1992.

Eto also said the plutonium would be shipped outside the 200-mile economic water zones to Japan from Europe and satellite communications would also be used to prevent possible hijacking at sea of the nuclear material.

Japan is planning to ask Britain and France to reprocess spent nuclear fuel into plutonium, which will be shipped back to Japan to use as a fuel for fast-breeder reactors.

Meanwhile, members of three defense-related panels of the ruling Liberal Democratic Party criticized the government's plan to send MSA patrol boats to escort the plutonium shipments.

In their joint meeting at the party headquarters, they said the sea transport of plutonium back to Japan should be made under the escort of Maritime Self-Defense Force (MSDF) ships.

They said there would be no legal problem in sending MSDF ships overseas for such escort missions.

LDP Criticizes Escort Plan

OW2510100389 Tokyo KYODO in English
0751 GMT 25 Oct 89

[Text] Ruling Liberal Democratic Party (LDP) officials Wednesday criticized the plan to send Maritime Safety Agency (MSA) patrol boats to escort plutonium shipments from Britain and France, possibly starting in 1992.

The officials at a joint meeting of the intra-LDP committees on defense, security and military bases voiced dissatisfaction that "such an important issue" involving the sea transport of nuclear material "had been discussed only by the cabinet ministers."

"The matter should have been presented to the LDP for discussion before making the decision," they said.

Japan is planning to ask Britain and France to reprocess spent nuclear fuel to plutonium, which will be shipped back to Japan for use as the fuel for fast-breeder reactors.

Some of the officials at the meeting said the sea transport of plutonium back to Japan should be made under the escort of Maritime Self-Defense Force ships, instead of the patrol boats that usually are of the 7,000-ton class and used only to patrol Japan's coastal waters.

They said there would be no legal problem in sending Self-Defense Force ships overseas for the escort mission.

Besides, if plutonium is hijacked on the high seas: "how could Japan explain to the rest of the world if it had not used its full defense power to protect it," an official said.

Government Decision Announced

OW2810143289 Tokyo KYODO in English
1307 GMT 28 Oct 89

[Text] The government has decided to assign Maritime Safety Agency (MSA) patrol boats to escort transport ships carrying plutonium from Europe to Japan, officials said Saturday.

The officials said the government will build large patrol ships capable of cruising 17,000 nautical miles nonstop from Britain and France to Japan.

Spent nuclear fuel from atomic reactors in Japan will be shipped to the two nations for reprocessing into plutonium, which will be shipped back to Japan to use as a fuel for fast-breeder reactors.

Defense-related groups of the ruling Liberal Democratic Party have insisted that Maritime Self-Defense Force ships be assigned to prevent possible hijacking of the transport ships by terrorists.

Japan has dropped a plan to airlift nuclear fuel because of opposition in the United States for fear of hijacking or accidents involving aircraft carrying plutonium.

The government also fears that assigning the Maritime Self-Defense Force to the escort role could provoke an uproar over the dispatch of defense forces overseas.

Safety Commission Concerned About Aging N-Plants

*OW2010025089 Tokyo KYODO in English
0039 GMT 20 Oct 89*

[Text] The Nuclear Safety Commission on Friday urged nuclear experts to pay greater attention to safety problems associated with the aging of Japan's nuclear plants.

"Until now most experts were concerned about major accidents such as the one at Chernobyl, so problems related to aging went unattended," said Haruo Suzuki, director of the Office of Nuclear Safety at the Science and Technology Agency.

He said the Nuclear Safety Commission included a section on aging of nuclear plants for the first time in its annual nuclear safety report, approved at Friday's Cabinet meeting, to raise awareness among nuclear workers and policymakers.

The five-member commission serves as an advisory group to the government.

Nuclear mishaps resulting from normal wear and tear on nuclear plant components have occurred over the past few years, but accidents were not necessarily identified with aging because of lack of awareness, Suzuki said.

"Twenty years have passed since Japan started building nuclear power plants, and it's time to think about their remaining 10 to 20 years of operation," he said. Experts estimate that nuclear power stations can be safely operated for 30 to 40 years.

The report said that developing a "safety culture" among nuclear plant workers and training inspectors to look for signs of aging such as corrosion and leaks could help reduce risks of operating aging plants.

The report also stressed more attention should be paid to accidents resulting from human error.

"Human error cannot be completely eliminated, but studies of human behavior can help identify and eliminate the causes of human mistakes," the 448-page report said.

SOUTH KOREA

Power Company To Build Nuclear Power Plants

*SK1310052889 Seoul YONHAP in English
0441 GMT 13 Oct 89*

[Text] South Korea will bring three more nuclear power plants on stream between 1997 and 1999, the Korea Electric Power Corp. (KEPCO) Friday.

Ground will be broken in July 1991 for a 700,000-kw Canada pressurized water reactor with completion scheduled for June 1997. The cost of the Wolsong No. 2 plant will be 836.6 billion won, according to the state-run corporation.

Construction of two plants to be equipped with 1,000,000-kw pressurized water reactors will start in May 1992. Dedication of the Uljin No. 3 plant is scheduled for June 1998, and the Uljin No. 4 plant for June 1999. The cost of the two plants will be 2.65 trillion won, the corporation said.

The three stations will bring the number of nuclear power plants in operation in the country at the end of the decade to 14.

ARGENTINA

Cavallo Acknowledges Development of Rocket Technology

PY2710165689 Buenos Aires NOTICIAS
ARGENTINAS in Spanish 2132 GMT 26 Oct 89

[Text] Foreign Minister Domingo Cavallo today announced that Argentina has mastered rocket technology, but "we do not have any armed missiles or plans to have any because we are not pursuing any military objective." Cavallo's announcement represents the first official statement made by the Foreign Ministry on this controversial subject.

During a news conference with foreign journalists, Cavallo asserted that Argentina has no plans to "disseminate" this high technology among the other developing countries. He said that this is "exactly" what President Carlos Menem told U.S. President George Bush during his visit to the United States.

When asked by a Spanish journalist about the degree of development reached by the "Condor II" rocket Cavallo said that "in 1977 Argentina decided to acquire the technology in the specific area for its Armed Forces to develop vectors.

Cavallo noted that "Argentina has already fulfilled that objective" but that "it does not intend to use that technology for bellicose or offensive purposes nor to disseminate it around the world."

The minister added that the country "does not have an armed missile, much less a deployed system. Argentina is not going to make any special effort to disseminate this technology."

Cavallo said the country "is now focusing on the development of technology for the aeronautics industry" based on the modern "Pampa" training aircraft.

This is the first time that an Argentine Government official has admitted that Argentina has mastered this technology. The "Condor II" has been called a rocket. The difference between a missile and a rocket is that the latter does not have a control and guidance system.

The government has so far maintained that the objective of "Condor II" is to launch a satellite into a low-altitude orbit. The rocket, however, can carry either a communications device or a bomb.

The "Condor II" forms the basis of the Argentine space program, which is being implemented by the National Space Research Commission, [words indistinct].

In 1983, Argentina announced that it mastered Uranium-enrichment technology, which can be used to build an atomic bomb. Argentina, however, has never built an atomic device.

The government policy regarding space technology is similar to the policy on nuclear technology. They are both for peaceful use.

Meanwhile, President Menem has designated Roberto Garcia Moritan, director of the Disarmament and Nuclear Affairs Department of the Foreign Ministry, as the new ambassador to the disarmament conference headquartered in Geneva.

Diplomatic sources have said that the decision by Menem (?follows) a policy "to designate specialized diplomats to technical posts," as in this case. Garcia Moritan is a specialist in international security affairs. He has been alternate representative to the disarmament conference since 1981.

The post to which he has been designated was occupied by current Deputy Foreign Minister Mario Campora. According to press reports, the post remained vacant because Menem was thinking of designating Supreme Court Justice Jose Severo Caballero, if he resigned his post.

CUBA

Atomic Energy Commission Official in CSSR

FL1610233789 Havana Radio Reloj Network in
Spanish 2250 GMT 16 Oct 89

[Text] Fidel Castro Diaz-Balart, executive secretary of the Cuban Atomic Energy Commission, today began an official 1-week visit to Czechoslovakia. According to various press reports from Prague, the Cuban leader was received this morning by Stanislav Havel, chairman of the Czechoslovak Atomic Energy Commission.

Afterward, Fidel Castro Diaz-Balart toured the factory located in the city of [name indistinct], which manufactures automated systems for technological processes that are used in electronuclear plants.

PRENSA LATINA news agency reports from Prague that Fidel Castro Diaz-Balart was invited by the Czechoslovak Atomic Energy Commission.

INDIA

Polar Satellite Launch Vehicle's Test Successful

BK2110161189 Delhi Domestic Service in English
1530 GMT 21 Oct 89

[Text] In a major breakthrough in the country's space program, the giant first stage booster motor of the Polar Satellite Launch Vehicle, PSLV, was successfully fired today. The ground test was carried out at the Sriharikota range in Andhra Pradesh at 1310. With this, all propulsion modules for the PSLV scheduled for launching in 1990-91 have been tested. The director of the PSLV, Mr G. Madhavan Nair, has said that the test went off smoothly and all objectives were fulfilled. The booster is the biggest ever design and fabricated in the country.

An official press release in New Delhi said that the 20-metre long motor has been developed by India Space Research Organization helped by the Vikram Sarabhai Space Center and other organizations. It has a diameter of 2.8 metres and contains 128 tons of solid propellant.

Our correspondent says that the SLV-3 [Satellite Launch Vehicle-3] and the ASLV [Augmented Satellite Launch Vehicle] vehicles used to carry 9 tons of propellant only. The PSLV's joint motor also has the distinctions of being the third largest solid booster developed anywhere in the world.

ISRAEL

Reactions to NBC Reports of Nuclear Ties to South Africa

Defense Ministry Denial

TA2610075089 Tel Aviv IDF Radio in Hebrew
0730 GMT 26 Oct 89

[Text] The reports on nuclear ties between Israel and South Africa are completely unfounded, the Defense Ministry spokesman said this morning in reaction to the NBC-TV report on Israeli-South African ties. Our military correspondent 'Amos Har'el updates:

[Har'el] The Defense Ministry spokesman again emphasized this morning that the Israeli Government's policy regarding the introduction of nuclear weapons into the Middle East remains as it has always been—namely, that Israel will never be the first to introduce nuclear weapons into the region. The spokesman said that there is absolutely no basis for the NBC report last night on alleged nuclear ties between Israel and South Africa. The Defense Ministry emphasized that the defense establishment scrupulously adheres to the Inner Cabinet resolution of 18 March 1987 that no new defense contracts will be signed with South Africa.

Sharon Statement

TA2610094389 Jerusalem Domestic Service in Hebrew
0900 GMT 26 Oct 89

[Text] Minister Ari'el Sharon has disclosed that the Inner Cabinet has held a long and extensive debate on Israel's nuclear policy. He claimed that decisions were made, which Israel follows. He reiterated that Israel would not be the first to introduce nuclear weapons into the Middle East. Minister Sharon was speaking on our program "It Is All Talk."

On the political issue, he said that contacts with the U.S. Administration are being held in a dilettante way. The prime minister, he said, has lost control. As a case in point, Minister Sharon noted several statements Mr Shamir has made against him and other Inner Cabinet ministers. He repeated his demand that the Inner Cabinet be fully briefed on contacts with the United States.

HADASHOT Article

TA2710100889 Tel Aviv HADASHOT in Hebrew
27 Oct 89 pp 2-3

[Report by Ilan Kfir, Shmu'el Tal, Shmu'el Rosenblum, Oron Me'iri, and Yosi Werther]

[Excerpts] NBC-TV continued to broadcast documentaries on the special defense ties between Israel and South Africa yesterday and last night. These reports also mentioned what the U.S. television network termed "nuclear relations." [passage omitted]

The report on Israel's nuclear relations with South Africa has angered Israeli political sources. [passage omitted]

The fear was expressed in Jerusalem that the leak of these reports from the Pentagon to NBC was intended to harm Israel. These reports present Israel as a violator of public pledges to the United States in which Israel had vowed not to provide military assistance to South Africa, certainly not insofar as the manufacture of combat aircraft and ballistic missiles with nuclear capability are concerned.

The Israel Aircraft Industries [IAI] was also piqued by the NBC reports. A senior IAI source denied the allegation that Israel continues to coproduce the Lavi aircraft with South Africa.

The defense establishment also issued a denial of the report. According to sources, Israel would never, under any circumstances, have risked transferring the Western know-how and technology that it possesses to South Africa, which is subject to an arms embargo.

As for the Israeli engineers who left the IAI or were dismissed, the sources said that every individual who was laid off as a result of the cutbacks that followed the termination of the Lavi project went his own way and presumably still works in the same area. Yet this has nothing to do with any Israeli project, certainly not with the Lavi.

Defense establishment sources have said that instructions governing the export of military know-how and cooperation with foreign countries in defense development are sensitive issues under close supervision. The sources added that in view of the embargo on the export of weapons to, and the development of weapon systems with South Africa, it would be far-fetched to assume that Israel would have risked the U.S. military and civilian aid it receives, to the tune of \$3 billion per annum, by taking action that contravenes the embargo policy. [passage omitted]

IDF Radio Report

TA2610120189 Tel Aviv IDF Radio in Hebrew
1100 GMT 26 Oct 89

[Excerpts] Prime Minister Yitzhaq Shamir has said that the NBC-TV report concerning the joint development of a nuclear missile by Israel and South Africa is totally unfounded. It is a complete lie, Mr Shamir said in an interview with the Voice of Israel's Arabic department. [passage omitted]

The South African ambassador to Israel has said that he knows nothing of Israeli-South African ties of the kind reported by NBC. Our correspondent Itay Engel spoke this morning to Ambassador Johan Viljoen:

[Begin recording] [Viljoen, in English] Well, I also heard news on the radio this morning, and that is really all I know about this matter. So, I do not have any information or knowledge about such cooperation between Israel and South Africa. These, of course, are allegations which have been made over a number of years, and perhaps that question could best be answered by the Israeli authorities.

[Engel translates and continues] All that Ambassador Viljoen was willing to add on this issue is that the South African defense industry is highly developed. Proof of this can be found in the fact that Pretoria is exporting weapons to 20 countries around the world. The Israeli Government, according to him, is the only authority that can and should comment on the NBC report. [end recording]

Rabin Statement

TA2610184989 Tel Aviv IDF Radio in Hebrew
1830 GMT 26 Oct 89

[Text] Defense Minister Yitzhaq Rabin also has denied the reports that Israel and South Africa have jointly developed a nuclear missile. Rabin said that unfortunately for us, stories circulate from time to time claiming that Israel is in possession of nuclear missiles. Israel subsequently denies these allegations.

Our correspondent Shay Kreitel reports that Minister Rabin made these remarks at a Labor Party convention in Ramat Gan.

Rubinstein Refutes Report

TA3010053089 Jerusalem Domestic Service in English
0500 GMT 30 Oct 89

[Text] Israel yesterday categorically denied the NBC report of Israeli nuclear cooperation with South Africa and the transfer of U.S. technology to South Africans. Cabinet Secretary Elyaqim Rubinstein:

[Begin Rubinstein recording] The State of Israel will not be the first one to introduce nuclear weapons into the Middle East. Frankly, there is no truth whatsoever to the NBC report made in the United States last week on alleged links between Israel and South Africa in the nuclear field. The Ministry of Defense spokesman emphasized, and was repeated today, that the Israeli defense establishment is true and implements the Israeli Cabinet decision of 18 March 1987, which says that no new defense contracts between Israel and South Africa should be signed.

Also, as far as the U.S. technology, the defense establishment did not transfer from Israel to any other country U.S. technology or systems that include U.S. components without permission by the U.S. authorities. This applies to any foreign country, including South Africa, so all allegations that NBC reports that U.S. Lavi technologies were transferred, allegedly, to South Africa are baseless. [end recording]

Defense Ministry Denies Other Transfers

TA2710185189 Jerusalem Television Service in Hebrew
1815 GMT 27 Oct 89

[Excerpt] The Defense Ministry has issued this statement: The defense establishment has not transferred either U.S. technologies or systems containing U.S. components, from Israel to other countries, without obtaining permission from U.S. authorities.

The sources denied outright the allegations raised in the NBC report according to which Israel had transferred U.S. technology employed in the Lavi plane to South Africa. [passage omitted]

HA'ARETZ Assessment

TA2910101389 Tel Aviv HA'ARETZ in Hebrew
29 Oct 89 p 3

[Report by 'Aqiva Eldar]

[Excerpts] The NBC report on Israeli-South African cooperation is unrelated to tension surrounding the political process. This is the assessment in Jerusalem, following the realization that the initiative for the television report had come several months ago and that the documentary was prepared as part of a series investigating various countries' nuclear ties with South Africa. [passage omitted]

Political sources in Jerusalem expressed their view that, in light of the reactions of President Bush and the State

Department spokeswoman, the issue will fizzle out and disappear from the public agenda by the week's end.

Rabin Interview

TA3010065789 Jerusalem Domestic Service in Hebrew
0505 GMT 30 Oct 89

["Special" interview with Defense Minister Yitzhaq Rabin by military affairs correspondent Karmela Menashe; time and place not given; recorded]

[Text] [Menashe] Defense Minister Yitzhaq Rabin, the NBC television network is continuing its series of reports on the nuclear ties between Israel and South Africa, while here in Israel the reports on defense cooperation between the two countries are continuously being denied.

[Rabin] On the television programs you specified, many different matters were mixed together. I will not go into detail regarding the television reports themselves. Occasionally, at odd times, reports are leaked to the U.S. media on various issues that deal with the problems of manufacture, research and development, and Israel's ties with other countries. The specific television program you mentioned comprised varied and diverse subjects; therefore, I consider it preferable that I explain the principles of Israel's policy on the entire complex of issues addressed.

The first issue is related to Israel's nuclear policy. For a lengthy period covering many years, Israel has emphasized that its policy on anything connected to nuclear weapons is that Israel will not be the first country to introduce nuclear weapons into the Middle East. This has been our policy, it is still our policy, and it will remain our policy.

The second issue concerns the charge that Israel maintained nuclear contacts with South Africa. This report is totally untrue; it is a completely unfounded story. In simple words, it is simply almost a lie—not almost, but a lie.

The third matter concerns everything Israel receives from the United States, whether equipment, equipment parts, or technology that is either delivered directly to us or Israeli technological developments financed with U.S. funds, such as the Lavi once was. Israel is bound by U.S. law not to deliver any component of which we are the final users or, as the Americans call it, the end user [last two words in English] and not to pass on U.S. military technology to any foreign country. Israel would not risk losing U.S. aid by breaking American law and violating these rules. Therefore, our stated policy, which is also being followed in practice, is that we do not transfer U.S. equipment, U.S. military parts, or U.S. technology to any foreign countries, and certainly not to South Africa.

[Menashe] Do you think this is a case in which false reports were deliberately planted in order to disrupt Israeli-South African relations?

[Rabin] I do not want to enter into any discussion concerning the motives and timing of those who leaked or made public this report, but the third [as heard] thing I would like to address is the entirety of Israeli-South African military relations. I saw the NBC television report, and I saw the South African missile boats, for example. This story is 15 or 17 years old, and therefore it is simply irrelevant. It combined periods from 20 years ago with today's reality. In the wake of U.S. congressional legislation at the end of 1986 and the beginning of 1987, the Israeli Cabinet made a decision in March 1987 that stipulated that Israel would not sign any new military contracts with South Africa. This decision has been upheld.

[Menashe] And today, Mr Rabin, is there no military cooperation between Israel and South Africa?

[Rabin] I repeat what I said: In the past we maintained ties, but since the Cabinet decision of March 1987, we adhere to that decision. There are no new agreements in the military sphere between Israel and South Africa.

[Menashe] It has been reported that the U.S. President said that the nuclear ties with Pretoria may complicate U.S.-Israeli relations.

[Rabin] Perhaps, if there were in fact such ties, but, because they do not exist, there is no reason for relations to be complicated.

Netanyahu Interview

TA2810112689 Tel Aviv IDF Radio in Hebrew
0905 GMT 28 Oct 89

[Telephone interview with Deputy Foreign Minister Binyamin Netanyahu by Dani Vessely "a short while after Netanyahu's return from Europe"; live]

[Excerpt] [Vessely] Good Sabbath to you, Mr Netanyahu.

[Netanyahu] Good Sabbath to you, too.

[Vessely] You must be up-to-date already on the recent events or developments in our links to Washington. It seems, at least according to reports emanating from the United States, that Washington has found a new-old way to pressure us. Is this indeed so?

[Netanyahu] You are using a generalization in talking of Washington. One should remember that the U.S. administration is not a single body. I greatly doubt the assumptions made in the press to the effect that it was the administration or the secretary of state, as it were, that instructed this wicked and distorted leak. I am doubtful since, for one, these tales also embarrass the U.S. administration. It is being accused of all sorts of things. One should understand that there are always radical anti-Israeli elements in the U.S. administration that harness themselves to this anti-Israeli campaign that the Arab countries have developed for some years now and that concerns South Africa. I encountered it in the United

Nations on numerous occasions. It has happened time and again, usually before a major event or in the course of delicate Israeli-U.S. contacts, that various false rumors have been disseminated to embarrass us. This is nothing new.

[Vessely] Are these elements the source of the leak then, or is this entire story or rather the timing of its publication purely accidental?

[Netanyahu] I am inclined to believe that the timing of this publication is not accidental, but I believe it should be attributed to these constant elements. The anti-Israel campaign, the attempt to link Israel to South Africa, is a well-known Arab tactic. It is supported by those Arabist allies of the Arabs in the United States. These Arabists are present in various branches of the U.S. administration, including the intelligence services, and they do not care if they damage the United States' reputation as long as they deal Israel a very strong blow.

[Vessely] In the wake of this report, the prime minister rushed to deny any links to South Africa. Why is it so important for us to emphasize that there are no links, at least not such links, between us and South Africa?

[Netanyahu] Simply because this is not true. The prime minister expressed Israel's position and gave its clear answer on the matter. The attempt by the Arab countries to link us to South Africa is very strange, though. The Arab countries maintain trade relations with South Africa, involving oil and billions of dollars annually. They, in fact, sustain the South African economy or at least supply it with energy in more than one way.

I am not here to debate the question of whether or not countries that disagree with another country's internal regime can maintain relations with it. In my opinion, this is possible and done by all countries, including African ones. Still, the Arabs attempt to slander Israel and to raise unfounded charges against it. The present case is but a new example of this, and its partners are located in the United States now.

[Vessely] On the basis of your extensive experience in worldwide diplomacy, do you believe that this storm will subside by itself and that the international community, particularly the United States, will accept the Israeli denials? Or, alternatively, are we facing a problem with regard to both the South African and nuclear issues?

[Netanyahu] There were such examples in the past, and they did not take root. When something is untrue, it cannot take root. Let me make a more general statement here, though: We are currently engaged in a struggle over our basic interests, interests related to our future. A country cannot change its positions, especially with regard to crucial and fateful matters, on the basis of one wicked attack or another. We have to keep cool and not take fright or get too anxious. We have to insist on our own, to give a firm answer, of course, and to convince our numerous U.S. friends of the facts, as they are, as well as of the justness of our struggle. We have to explain what we are struggling for

and why it is important for us to repel these leaks or attacks, which are not accidental and which certainly concern basic elements of our security. [passage omitted]

PAKISTAN

Daily Welcomes Bush Certification on Nuclear Bomb

BK1810125989 Islamabad THE MUSLIM in English
9 Oct 89 p 4

[Editorial: "Nuclear Issue and the Presidential Nod"]

[Text] With the final nod of presidential approval in Washington that Pakistan does not possess a nuclear bomb, the decks have been cleared for finalisation of next U.S. financial year's aid package to Pakistan. That only leaves the two Houses of American Congress to reconcile the minor differences in allocations approved by each earlier in various components of the proposed aid to Pakistan. According to reports, President George Bush who signed the certification regarding Pakistan's nuclear programme on Friday night, had based his judgement "on all available evidence" in this regard. Although American assistance to Pakistan currently forms part of a six-year 4.02 billion dollar package, such annual certification by the U.S. president is a statutory requirement before the finalisation of each year's aid chunk. The Pressler Amendment prohibits U.S. aid to any country that possesses or is suspected of possessing a nuclear explosive device. American president's certification thus becomes obligatory.

Irrespective of the immediate relevance of the U.S. president's certification in the aid context, the confirmation by Mr Bush should clear a lot of unnecessary confusion about Pakistan's nuclear programme. The American president's certification is a most responsible act of formal commitment in black and white. It has once again vindicated Pakistan's consistent position that the country does not possess a nuclear device. Unfortunately, the question has been politicised and used by various quarters to cast doubts about the peaceful nature of Pakistan's efforts to acquire nuclear knowhow. Atomic energy is not just another name for the atom bomb. There can be no justification for anybody's grudging Pakistan's efforts to make use of nuclear energy to meet the country's growing demands in a number of perfectly peaceful fields like power generation.

As for the question of the atomic weapon, Pakistan has consistently adhered to the principle of nonproliferation. Islamabad has never shied away from signing the NPT [Nonproliferation Treaty] if India—with a demonstrated capability to produce the bomb—also agreed to do so. The Prime Minister of Pakistan has only recently reiterated the country's approach in this regard. Ms Benazir Bhutto has also made it clear that Pakistan could not under any circumstances be expected to renounce unilaterally the nuclear option. It is a welcome development indeed that the American Administration at the highest level has proceeded to accord recognition to Pakistan's principle position.

Witnesses Recall 1957 Accident at Kyshtym

51003025 Moscow PRAVDA in Russian
25 Aug 89 pp 1, 4

[Article by Vladimir Gubarev: "Nuclear Trace"]

[Text] Buldakov was going to work as usual along one of the main streets of the city. Until recently it bore the name of Beria and the residents called it this out of habit. For too much of their destinies has been associated with this man, or, rather, with his name. Was this fear? Perhaps not.

In this city and in many others which the people have christened "atomic" there was no fear of Beria because relations were different between the "atomic workers" and the "leader's faithful adviser." Moreover, he sometimes even ingratiated himself not only to Kurchatov, Khariton, and Bochvar but also to the rank-and-file engineers who worked at Chelyabinsk-40. That is the way it was, paradoxical as it may have been. With all of Beria's apparent power he understood nothing about physics and he remained silent when the subject came around to uranium, plutonium, the separation of isotopes, "items"... And the success of the work frequently depended precisely on the rank-and-file engineers. Their success—whether it be an idea or a new instrument—also meant the destiny of the leader's adviser himself who bore personal responsibility for the creation of nuclear weapons under Stalin.

While Buldakov is traveling along Beria Street, let us take a little excursion into the history of this city. It also includes Academician Yuliy Borisovich Khariton, three times Hero of Socialist Labor.

We have met him many times. He has discussed A.F. Ioffe, I.V. Kurchatov, and the beginning of the forties when he and Ya.V. Zeldovich first "touched off" a chain reaction. But we have never discussed the creation of a nuclear weapon! The answer is simple—the area in which Yu.B. Khariton worked was classified "top secret" and the prefix "super" was even added to that!

Now the situation has changed, although the "secrecy" remains... Incidentally, this is the way it should be: Glasnost cannot abolish state secrets.

From a conversation with Yu. Khariton:

"Did you have frequent contact with Beria?"

"At first all the problems were solved through Kurchatov... But then I too had occasion to communicate with him."

"Did he deal with you?"

"He had to... Beria knew that he understood nothing about our work... I repeat, he was forced to pay attention to us... For example, there was this case. Some time at the beginning of the fifties a personnel inspection commission came to our workplace. The members of the

commission called in the leaders at the level of laboratory chiefs. The commission also questioned Lev Vladimirovich Altshuller. In particular he was asked this question: "What is your attitude toward the policy of the Soviet authorities?" Altshuller sharply criticized Lysenko saying that he was an illiterate and dangerous person. Naturally, the commission ordered to have Altshuller removed. Zeldovich and Sakharov came to me and told me about the commission. I called Beria. He asked: 'Do you need him very much?' 'Yes,' I answered. 'All right, let him stay,' Beria said, unwillingly it seemed to me. They did not touch Altshuller... Incidentally, in Stalin's presence Beria immediately became a different person, his arrogance immediately disappeared..."

"Did you have occasion to observe this?"

"Once... I was invited to his office and there were many people there. I went in but I did not see Stalin... Beria was bustling about and then he pointed to one side. I looked and there was Stalin... They asked me to discuss the first bomb. 'But is it not possible to make several small ones instead of one large one?' Stalin asked. The question, of course, was naive. 'No,' I answered. They were all satisfied... In general they trusted us because nobody else was able to make a bomb. And we understood this as well..."

"The bomb originated in Kyshtym?"

"This is one of the first and main enterprises of our atomic industry."

Buldakov was almost late and so he stepped on the gas... And at that moment the Pobeda was hurled to the side. Buldakov slammed on the brakes, not immediately understanding what had happened. He looked in the direction of the combine: A column of smoke had begun to rise up there over the buildings. It grew quickly and almost reached the clouds... An explosion? But why?

The column of smoke formed over the area where the containers of radioactive waste were located.

What could explode there?

Buldakov drove up to the entryway and walked onto the grounds. As could be expected, he immediately started in the direction of his laboratory...

Buldakov had not yet guessed that almost all of his life would to one degree or another be firmly linked to the catastrophe that occurred on 29 September 1957.

From the memoirs of M.G. Pervukhin:

"The long-awaited day when the reactor would be completed had finally arrived and they had started to load the uranium slugs. Igor Vasilyevich was personally in charge of this responsible work and checked the instruments against the background of the flow of neutrons so as not to miss the moment when the chain reaction began. Everything proceeded normally, the expected movement arrived, the reactor came alive, and the

continuous chain reaction began. Now the next task was to accelerate the completion of the installation of equipment at the chemical plant where the plutonium was to be separated from the uranium that had been irradiated in the reactor. All the complexity of the startup and control of the chemical process consists in that the medium of uranium dissolved in nitric acid is highly radioactive and therefore all equipment and pipelines are located in chambers that are inaccessible during operation. The process is remote controlled and therefore both the chemical process itself and the equipment must work reliably and continuously.

"To our great satisfaction the startup and operation of the chemical plant proceed quite normally. Here one should note the great service of Academician V.G. Khlopin and his close coworkers from the Radiyev Institute who developed a quite stable and reliable chemical process of separating the plutonium from the uranium and the radioactive oxides. Thus the entire combine with the uranium graphite reactor went into operation in 1948 and began to produce plutonium.

"Igor Vasilyevich had not lost sight of other directions of work on the atomic problem. He always kept up with the work on diffusion and electromagnetic separation of uranium isotopes. In that same year of 1948 construction was completed on a plant for the diffusion methods of separation whose technological process was developed under the scientific leadership of I.K. Kikoin.

"The development of the electromagnetic method of separating uranium isotopes was conducted under the leadership of L.A. Artsimovich who was also enlisted in this work by Igor Vasilyevich. I.V. Kurchatov also kept abreast of the work of A.I. Alikhanov for designing a 'uranium-heavy water' reactor. He was also interested in other projects."

At the beginning of September Boris Vasilyevich Nikipelov went on vacation. He returned a month later. He had already become a senior engineer and so he decided to come to the shop a little early. As usual, the bus stopped at the industrial site. After the document inspection they were to drive through the area... But this time they were told to go and get into another bus.

"I had been working at that enterprise for more than 2 years," recalls Boris Vasilyevich, "and the level of secrecy was the highest: I did not even know that there was a storage facility at our enterprise. Nobody spoke about the accident. But we understood that the situation was very serious because we had to change our clothing... Even the money in the city was 'dirty.' Incidentally the smaller the denomination, the 'dirtier' it was and the more rapidly it 'changed hands'... At first I was working as an operator and then shift and senior engineer and finally I became the head engineer of the combine. After 1955..."

In September 1957 in this city before going into his apartment the resident took off his shoes. First this was a necessity—why bring "dirt" into the apartment?—but now it is a custom.

FROM THE OFFICIAL REFERENCE:

"During the first years of the operation of the enterprise in this branch of industry there was no experience or scientific development of questions of protecting the health of the personnel or the environment. Therefore during the fifties there was pollution of individual parts of the territory around the enterprise. Significant radioactive pollution was caused by the accident on 29 September 1957.

"The discharge amounted to about 2 million curies...

"...For comparison: In the accident in Chernobyl 50 million curies of radioactivity were discharged..."

They were called "permanent storage containers." In an immense concrete container (the walls were 1.5 meters thick) they kept "pans" made of nonrusting steel. A special ventilation and cooling system operated automatically.

Nuclear production wastes were stored here.

These containers had already been in operation for 2 years. An inspection brigade appeared several times a day. On that day the engineers did not notice anything unusual although, true, the walls of one of the containers were warm...

In these days this was called "mismanagement" or "criminal negligence." But let us not forget that all this took place in 1957 and the physicists and engineers knew too little about the processes they were assimilating.

The containers performed their role; they stored the radioactive wastes reliably—this is shown by the radiometric monitoring: The background at the site did not increase...

If only it had been possible to look inside!

The cooling failed in one of the containers and the solution started to "dry out." There was a precipitate and the temperature in it gradually began to rise. The precipitate became denser and the level of the liquid dropped... An explosive mixture—essentially that same powder—began to form on two of the containers...

The explosion was so strong that the 1-meter thick concrete lid was thrown off like a feather. Ninety percent of the radioactivity splashed over the site and 10 percent gushed upward. The column Buldakov saw from his Pobeda rose up 1 kilometer. Unfortunately there was a strong wind and the radioactive cloud began to spread. Within 4 hours it was already 100 kilometers away, and in 10 hours it was 300 kilometers away. A "nuclear tongue" formed in which there was a predominance of

strontium-90, and it stretched across Chelyabinsk, Sverdlovsk, and Tyumen oblasts. It was 8-9 kilometers wide.

The radiation level in the city rose sharply but the combine continued to operate...

From a conversation with Yu. Khariton:

"Recently Andrey Dmitriyevich Sakharov was talking about the creation of nuclear arms: 'I too exerted an immense amount of effort because I thought: This is necessary for world balance. You understand that I and others thought that this was the only way to avoid a third world war...'"

"Did you agree with him?"

"Of course. It was necessary to provide for the country's defense. There was calm and hard work in the collective of scientists. Cohesion, strong friendship. Of course there had to be a few sons of bitches... Once I arrived at the combine. Igor Vasilyevich Kurchatov had invited me; it was his birthday. We all had a few drinks... And then one of the workers came up to me and said: 'If only you knew how much has been written about you!' I understood: There were plenty of informers at that time—after all, Beria's people were everywhere."

"Did they frequently call you the father of the atom bomb?"

"That is wrong. The creation of the bomb took an immense number of people. The reactors involve a gigantic amount of work! And separating the plutonium? Plutonium metallurgy was Academician Andrey Anatolyevich Bochar's job... Nobody can be called the 'creator of the atom bomb.' It would have been impossible to make one without a gigantic complex of scientific and research work... There is no doubt that a major role in the uranium project belongs to Igor Vasilyevich Kurchatov. I was in charge specifically of the creation of the bomb and all the physics... At first we had to reduce the material with an ordinary explosive in order to obtain the supercritical mass... As early as 1940 Ya.B. Zeldovich and I calculated that it would take 10 kilograms of plutonium when actually it took several times more... It had to be obtained and this is extraordinarily difficult..."

"Was Kurchatov the initiator?"

"He enlisted all of us in the uranium project. When it had all begun he came to me and asked me to be in charge of 'branch laboratory No 2,' that is, to handle the explosive, the plutonium, and the design of the atomic bomb. I was with Yakov Borisovich Seldovich. He became the head theoretician. An amazing person..."

"I was happy to meet and talk with him. But he did not like to talk about the creation of the bomb..."

"He did not have the right to... You were young and did not completely understand what 'secrecy' meant in those years..."

"One time I touched upon this when I was writing about Academician Bocharov and a 'biscuit of plutonium' he had received... I asked him to discuss his work if only in general terms but his response was: 'Not for anything! I discuss this problem in my laboratory only with a limited number of associates!'"

"The times were such that a slip of the tongue could cost you your life... And we became accustomed to that... It was a great pleasure to work with Yakov Borisovich Zeldovich and later with Andrey Dmitriyevich Sakharov. These are two absolutely fantastic people. I respect them—both as scientists and as people."

"Did you have your doubts about the first bomb—either that it would never come to pass or that it would not work?"

"No. The quantity of plutonium we had at our disposal showed that: It would be the way we intended. We were not afraid of failure. For everything had been tested experimentally. I recall this episode. Vannikov appeared at one of the assemblies where they were doing the final testing. He came closer and began to read the gauges. He was a large man, very hefty—then the neutron section returned. He went back and forth and read the gauges... B.L. Vannikov was in charge of the project's engineering section. Before the war he had been in jail and then they released him—he was an outstanding organizer. Both during the war and on our project... So during this episode we understood: The bomb would definitely work."

"But what about the radiation?"

"I shall not try to hide the fact that we were very unconcerned about that. And also we did not know very much. Of course we were as careful as possible but, you understand, the country's security depended on us! Incidentally even in those years biologists and medical experts had already begun to study seriously all problems of radiation protection..."

"One should not play around with radioactivity but there is no need to fear it either"—Buldakov's teacher, Nikolay Vladimirovich Timofeyev-Resovskiy, loved to repeat this phrase. That same "die-hard geneticist." At that time he was working in Kasli and his group included scientists from Germany. In 1950 Buldakov came to Kasli as a surgeon. One of the Germans had caught a cold, run a temperature, and had gone to Buldakov—there were no medical practitioners nearby. The surgeon prescribed a "nonstandard medicine"—tea with raspberry jam. In the morning it was as though he had never had a cold. The Germans ran to their boss. Kamenevskiy did not betray his principle; he always summed up a situation with an aphorism. "A genius is in our midst"—he said about the surgeon. And he uttered his next aphorism in the physicians office where he went immediately. "Stop treating fools, transfer to me," Nikolay Vladimirovich pronounced his words clearly and thus

determined the fate of the future academician of the USSR Academy of Medical Sciences Lev Aleksandrovich Buldakov.

Incidentally, the path to the present day was long and hard, and the Ural tragedy played a significant role in the scientist's destiny. The former surgeon had worked for 5 years and then he became a scientific associate in Timofeyev-Resovskiy's group. They were studying the influence of various doses of radiation on plants, bodies of water, and animals.

Then Buldakov received orders to appear at such and such an address in Chelyabinsk. It turned out to be an unprepossessing barracks where a personnel officer was sitting behind an ordinary desk. He looked over the documents attentively. Then a bus came and the scientific associate was sent to his laboratory in the same city, which you cannot find on the map to this day...

Radiation medicine and biology were firmly on their feet. It was necessary to experiment and study the real situation, including at the combine, for no matter what they said, a new element that did not exist in nature had originated here. The nuclear age meant plutonium above all... Its power was shown for the first time in Nagasaki (a uranium bomb was exploded near Hiroshima). The majority of the data obtained after the bombing of Japan was classified by the Americans. Not all of it has been published even to this day... For then came 1957 and at staff headquarters in the Pentagon they designated the 100 Soviet cities that would be the first to be targets of a nuclear attack. Among them was Chelyabinsk...

Buldakov also processed the data obtained after our tests. Oh, how satisfactory they were at that time, at the end of September 1957!

From the memoirs of V. Vlasov:

"In addition to the readiness of the 'item' and the testers, the weather also influenced the choice of a time. It was necessary to select a time when the wind would blow the radioactive cloud in the direction of sparsely inhabited expanses. Otherwise the radioactive fallout from the cloud could harm people and livestock and poison the locality. Finally we learned that the test was scheduled for early in the morning of 29 August 1949. We waited.

"At precisely the appointed time a glow burst out in the south and there appeared a red semicircle similar to the rising sun. Within 3 minutes after that the glow faded, the cloud dissolved into the predawn haze, and we were reached by the booming thunder of the explosion which sounded like a heavy storm in the distance.

"There were no traces left from the central tower. The surrounding columns and towers were damaged and listing to the side, the walls of the nearby buildings had collapsed, and the roofs had either been torn off or had caved in. There remained a distorted reminder, as in a

nightmare, of the technical orderliness of the structures—everything had been mowed down, uprooted, and set afire.

"Sparkling bluish black in front of us was the surface not of a crater but of a plate left by the explosion. One was almost not aware of the depression because it was very broad and gently sloping. And the surface was covered with slag, melted smooth and sparkling, that was formed from the soil scorched by the fire of the explosion. At the very center the melted surface was unbroken and as one moved away from the center one could see uneven and broken areas, and finally there were individual fritter-shaped pieces either formed on the spot or spilled out of the center. There were few of them around the borders of the danger zone and the radioactivity did not seem to us to be high enough and therefore we decided to go 'deeper' for samples. We decided that we were not afraid of reaching the permissible dose for one-time exposure to radiation, and counting on this level we planned to go inside the plate. At a good speed the 'kozlik' cut into the crust of slag crunching under the wheels and at the specified distance it stopped; two of us jumped out on the right and left, cut off hefty pieces, stuck them in a sack, and the 'kozlik' took us back. We had put on gas masks to protect us from the dust."

From the memoirs of A. Burnazyan:

"The radiation safety service was assigned two tanks to gather dosimetric information in the epicenter of the explosion. Dosimetric equipment was to have been installed on them. A great deal of importance was attached to the tank trip.

"In order to provide for the safety of the crew it was necessary to increase the antiradiation protection of the tanks with a layer of lead on the bottom. The tank personnel objected: Too large a load will fall on the torsion bars (steel springs that go inside the tank in the shape of thick bars).

"Then it was suggested that the gun turrets be removed from the tanks. Without them the load on the torsion bars would be lighter and it would be possible to mount the lead layer of the necessary thickness on the bottom.

"The military men were skeptical about this: Without the turret and machine guns the silhouette of the combat machine would suffer a great deal. It would be not a tank but a pathetic dusty turtle. Igor Vasilyevich Kurchatov had to intervene in the fate of the silhouette of the reconnaissance tank and he solved the problem with his typical sense of humor. Smiling broadly and running the fingers of his right hand through his beard, Igor Vasilyevich expressed the thought the atomic tests were not a dog show and the reconnaissance tank was not a show poodle that had to be groomed so that the high jury would award it a medal for its appearance and carriage. Young people whose health must be protected were to be riding in the tanks.

"We dispersed to our places and attached ourselves to the periscopes. From the little knoll one could see neither the field nor the tower but it was clear to everyone that the light from the glow of the atomic flash had reached our periscopes. The little knoll lying just ahead of us was glowing with an incredibly bright light that could not be compared to anything.

"In the incinerating light we could see how the shock wave was spreading and bringing the clouds down from the sky over the location of the nuclear explosion. The tanks were tossed around like feathers. On one of them the fasteners holding the arm in the upper position did not hold, the arm dropped, and when it hit the ground one of the two ionization chambers was damaged. For several minutes we observed from the hill the formation of the radioactive cloud. Through the binoculars one could see the 'frying pan' of glazed earth sparkling maliciously in the rays of the setting sun in the epicenter of the explosion.

"The two tanks started at the same time and place but as soon as they got beyond the hill they separated and each took its own route to the previously earmarked sectors. We put on our gas masks in order not to breathe in the radioactive dust and took off at maximum speed.

"Without slowing up, the tank burst toward the epicenter. Literally within 10 minutes after the explosion our tank was at the epicenter. A fairly broad picture of destruction was spread out before our eyes. The steel tower on which the bomb had been hoisted had disappeared along with the concrete base and the metal had vanished into thin air. An immense crater gaped in the place of the tower. The yellow sandy soil all around had been baked and glazed and crunched in a terrifying way under the tanks caterpillar tracks. Small melted clumps of shrapnel flew in all directions and gave off invisible alpha, beta, and gamma rays."

The main events developed near the container involved in the accident—the center of the Ural tragedy. The radiation levels were immense (90 percent of the radioactivity was here!) and this nuclear wound had to be healed quickly. For the combine was operating and the city was living.

All residents of the city engaged in the struggle. There was no need to explain what to do here or how to do it. Protective measures were carefully observed: from changing clothing to personal hygiene.

The nuclear professionals approached the container...

A small digression. I heard many times that the people working in the uranium mines cleaning up after the accident in the Urals were "death-row inmates," people who had been sentenced to the ultimate punishment. I visited both the pits and the strip mines and there were none of them there. Yes, there were prisoners working on the construction of nuclear facilities but none of them remained there after the completion of the construction project. It would be interesting to know where these

rumors came from. Incidentally, the same thing was said about Chernobyl but I assure you there were no prisoners there... And so, where did the rumors come from? I think they came from a complete lack of understanding of an elementary truth—that you can fight against radiation and defeat it only if you know about it—ignorance is its main ally....

Chemists and physicists, scientists and engineers came to the epicenter of the Ural tragedy. There was no technical equipment, robots, or special machines—they appeared later, but there was something else: an understanding that the consequences of the accident had to be eliminated quickly, and since the levels were immense, it was necessary to act with maximum caution. "There is no need to fear radiation, but one must not try to befriend it..."

"Nobody died in the explosion itself," Boris Vasilyevich Nikipelov clarified. "Two to three hours before the accident, an inspection group went through, but nobody was near the containers at the time of the catastrophe... When cleaning up after the accident we monitored as strictly as possible the doses people received and therefore nobody took thoughtless risks. Of course all of us had much more than is acceptable according to the norms but one must understand: We had been educated so that we knew what to do and why. It was civic psychology—think first about the cause and only later about yourself! 'Nuclear psychology' is knowledge, responsibility, and an understanding of the scope of the work. For example, I am surprised when today certain specialists call the reactor a 'samovar,' something with a simple and reliable design. And sometimes even a 'pan'... This is very offensive and dangerous... For if one looks into the essence of the Chernobyl tragedy, they forgot the principle proclaimed by I.V. Kurchatov: 'The reactor should never be left without water, and then there will be no accidents!'"

Nikipelov is right! Kurchatov's commandment is just as timely today as it was at the dawn of the atomic age... But I digress. Let us return to the accident. At the center of it was an incredible amount of difficult and dangerous work, but the accident did not take a single life; nobody received a fatal dose...

Unfortunately, we are poor at mastering the lessons of the past. During the first days in Chernobyl I was surprised that there were few professionals working in the zone. Yes, there were a lot of people and technical equipment, but the vehicles moved the radioactive dust around, sometimes over thousands of kilometers... In the Pripyat city of atomic workers only a few people knew what had to be done. And I did not see the professionals who cleaned up after the accident in the Urals appear in Chernobyl until 20 May. While in the Ural catastrophe the main thing was to pay for a lack of knowledge, in Chernobyl it was flagrant ignorance and negligence. And Kurchatov's orders have been forgotten: "Never leave the reactor..."

In cleaning up after the accident in the Urals there were many who worked at the epicenter of the nuclear explosion. They were already familiar with the portrait of the criminal called "radiation."

From a conversation with Yu. Khariton:

"Yakov Borisovich Zeldovich once was talking about a strange sensation he experienced during a nuclear explosion. He was looking at the grass—it was completely silent and suddenly the grass bent over and lay down, and only after that came the sound..."

"We were 10 kilometers away from the place of the explosion. In a special casemate. It took approximately 30 seconds from the flash until the shock wave arrived. The door to the casemate was opened. Suddenly a bright light poured over everything—so it was done! I was thinking about only one thing—how to get the door closed before the shock wave came. Right then Beria rushed to hug me... I could barely manage to tear myself away from him... The only thing I felt during those moments was relief..."

"How many nuclear explosions have you seen in your life?"

"I do not recall precisely. They were all before 1963 when testing went underground. I can honestly say that there was no apprehension or terror. For everything could be calculated and so there was nothing unexpected. Of course there were blunders and mistakes, but this is a normal process..."

The biologists and medical workers followed the "nuclear track."

"The strictest normatives were adopted," says Buldakov. "Yes, they overinsured but, in the first place, they were speaking about healthy people and in the second place too much was still unknown. We honestly explained the situation to people and they were understanding about what happened..."

FROM THE OFFICIAL REFERENCE:

"Immediately after the accident over a period of 7-10 days 600 people were moved from nearby population points, and during the next 1.5 years—about 10,000 people. A total of 10,180 people were resettled. The maximum average doses of radiation received before the evacuation reached 17 rems from external radiation and 52 rems of the effective equivalent dose... The conditions for the utilization of the contaminated territory and the access of the population to it were introduced right after the accident in the lead part of the trace, and after the completion of the evacuation it was extended to the entire territory..."

There are events over which the years have no power. The memory carefully stores each detail, all the minutiae. More than 30 years have passed but Boris Vasilyevich Nikipelov and Lev Aleksandrovich Buldakov remember everything related to the Ural accident.

"There are innocent victims in every accident," says Nikipelov, "and it is natural that the feeling of guilt toward the people who have been forced to leave their native homes does not pass. But we are speaking about their safety, about the future of their children and therefore the state would make any expenditures. New settlements were constructed, compensation has been paid, and careful medical examinations have been conducted..."

Doctor of Medical Sciences Viktor Aleksandrovich Knizhnikov joins the conversation. He has been working on the medical aspects of the accident for many years.

"We have investigated a number of health indicators such as physical condition, blood generation, the development of children, the condition of newborn and their physical development, and so forth," he says, "and the examinations were initially conducted once a year and then once every 10 years. They are continuing even now: It is necessary to find out whether malignancies will appear in the people who have lived in the contaminated territory even for a short time. We have not managed to discover a dependency between radiation and child mortality, the appearance of anomalies in the offspring, or an increase in malignancies..."

"Do not think that there is no connection between radiation and disease," adds Buldakov, "but in this case we managed to prevent the radionuclides from entering the human organism, and preventive measures helped as well."

"Although the medical workers are now being criticized, their recommendations were correct. Much was unknown, but the overinsurance played its role..."

"Why was this not reported in the press?"

"A large number of scientific reports and papers were published," responds Knizhnikov, "and the specialists know about them. A careful analysis was conducted on the Ural tragedy. Unfortunately, it was not possible to say where this took place—the enterprise and the rayon were classified top secret."

"I think a great mistake was made at that time. We must not hide the truth from the people, and contradictory and incomplete information only led to deception," says Nikipelov, "and this has played a negative role in both Chelyabinsk and Chernobyl."

FROM THE OFFICIAL REFERENCE:

"The decontamination was conducted mainly through reploting agricultural land. During 1958-59, 20,000 hectares of arable land in the lead part of the trace were reploted and during 1960-61 on 8,200 hectares they did deep plowing, burying the upper contaminated layer to a depth of more than 50 centimeters... In Chelyabinsk Oblast they created six specialized sovkhozes and in Sverdlovsk—three; agricultural production was resumed in the latter in 1961. In Chelyabinsk Oblast the land was

practically restored for economic use by 1978. At the present time, 40,000 of the 59,000 hectares have been restored."

These dry lines from the official report tell of an immense amount of work done in the zone of the "nuclear tongue." I do not think there is any doubt that this experience is invaluable today for all regions of Belorussia and the Ukraine which suffered after the Chernobyl accident. Why are we doing such a poor job of taking advantage of it?!

A research station was created in 1958. Almost a thousand people are participating in its work—they include associates of the institutes of the USSR Academy of Sciences and scientific centers—biologists and physicists, medical experts and chemists...

What will happen to the land, forests, and water? How will nature fight against the strontium that fell from the cloud that rose up after the explosion?

A preserve was created in the lead part of the trace.

Recently First Deputy Minister Nikipelov, Academician Buldakov, and Professor Knizhnikov traveled through the rayons of Chelyabinsk Oblast, met the residents, and discussed the accident and its consequences. Reports on these meetings were published in the local press. I was surprised to read in one of them that "it is a disgrace—to this day nobody is allowed beyond the fences and barbed wire. Residents sneak in to the river to catch fish." And further: "Is it not time to eliminate this preserve?!"

One still cannot catch fish in the river! Even though it has been 30 years there are sections where the radiation levels are high. So should we be against preserves altogether? Even if the medical experts were to remove their "veto" the Eastern Ural preserve should remain inviolate. In the first place, this is a unique scientific station where a gigantic amount of invaluable work has been done and where surprisingly interesting and important results have been received and, in the second place, there are more birds in the Red Book there than in all the Urals.

No, "highly placed individuals" do not hunt and fish on the preserve as some people think. No, here they are engaging in major scientific pursuits without which our nuclear age would be impossible whether we like it or not.

And yet the experience of the Ural radioecologists is not being adequately utilized to eliminate the consequences of the Chernobyl accident—their work, results, and prognoses should be publicized and used much more extensively than they have been up to this point.

From a conversation with Yu. Khariton:

"All your life you have been creating atomic bombs and now we are striving to destroy atomic weapons. Does it now seem to you that your work..."

"...has been in vain? No... First we thought about the possibility of war and then it was a reality. Who knows what would have happened if the Soviet Union had not had its nuclear shield... I shall not conceal another aspect either: Not all of the consequences were taken into account at the time—we did not think about the possible destruction of mankind. It was important not to lag behind, to make sure that the potential enemy would not get ahead... But now mankind could perish and therefore we need a different approach to evaluating the consequences... Now I am much more concerned about another aspect—the fight against the AES [nuclear power station]. The people are moved by fear and there is a campaign against physics. But it is not the nuclear stations that threaten us with death but the greenhouse effect. And it is precisely with the AES that we can fight against this real catastrophe whose features are already in evidence. Safety and wastes are the reality of the atomic energy. These problems can be solved. But it is nonsense to strike out against the AES, to dismantle it and ban it. No, we must not make mistakes in design, construction, or operation—this is clear. But reasonable and serious utilization of atomic energy is a major direction. We must also work with thermonuclear energy."

"Are you convinced of that?"

"Absolutely! Atomic energy is the main path of mankind's development..."

We live in the present day and that means that we must take a serious look at what is happening.

Shortly after my conversation with Academician Yuliy Borisovich Khariton I became familiar with the nuclear research program in the United States. Many billions of dollars are being allotted for this program. This is why we hear NO to our proposals to eliminate nuclear weapons. NO—also to our proposals for eliminating underground nuclear testing. NO—to freezing the arsenals. NO—to halting tests under the Star Wars program.

There is no doubt that our peaceful initiatives are meeting with the broadest support on the planet, but though the nuclear arms race may have slowed up slightly it has not come to a halt. This is the reality.

The testing ground near Semipalatinsk is silent, but in the state of Nevada the tests are being conducted just as regularly as they were 10 or 20 years ago. What is this—a challenge or mistrust?

I do not wish to draw hasty conclusions, but I do not like this reality...

Our conversation turned to what bothers scientists and specialists most of all today.

"People's 'nuclear illiteracy,'" answered Boris Vasilyevich Nikipelov. "Even a 5-year-old child knows that you can take a battery into your hands but you cannot put your finger into an electric outlet. But what about radiation? There are people who practically faint

because the background is 2-3 times higher near granite but think nothing about taking into their hands a cesium source pried out of an instrument. Certain journalists develop a hacking cough with 0.9 milliroentgens per hour, and so forth. We know how radiation 'smells' but this occurs when one is measuring roentgens per hour not roentgens per year! It is my deep conviction that radiophobia comes only from illiteracy and ignorance"...

In my conversation with Nikipelov, Buldakov, and Knizhnikov I discussed the fact that on my editorial desk there are many letters of protest, including against the construction of the Yuzhno-Uralskaya AES. And yet this is the station that is best provided with high-grade

specialists, and it not only provides energy in places where there is a critical shortage of it but also cleans the lake which was contaminated with radionuclides during the fifties. So why are we protesting? Are fear and ignorance really going to prevail over common sense?

I asked Buldakov and Nikipelov:

"Are you agitating for the construction of an AES in the very city where you have lived for 30 years and why?"

"Our children and grandchildren are working and living there. We are thinking about their future..."

CANADA

Candu Feasibility Study Agreement Signed With Hungary

51200002 Toronto *THE TORONTO STAR* in English
27 Sep 89 p F3

[Text] Ottawa (CP)—Canada's nuclear industry is studying the possibility of building a Candu reactor in Hungary to serve Western Europe.

Atomic Energy of Canada Ltd. and Ontario Hydro Ventures have signed an agreement with a Hungarian state utility to study the feasibility of such a project, AECL spokesman Michel Hebert said in an interview yesterday.

The Hungarians "feel they have a market to sell electricity to Western Europe and they want to get some good technology," he said.

He noted that Hungary signed the Nuclear Non-Proliferation Treaty (NPT) last year, meeting a key Canadian condition for potential export customers.

"This is a very strong signal because they went to the trouble of accepting the NPT treaty and we think that's an indication they are serious about our technology."

Meanwhile, the crown corporation yesterday reported a profit of \$23.2 million for 1988-89, more than double the \$10.4 million in the last fiscal year.

But the figure is deceptive because it includes federal funding as income along with commercial revenue. In 1988-89, AECL received \$203.07 million in federal funds, mainly for research and development.

By comparison, the company earned \$88.9 million from the sale of nuclear services in 1988-89, \$32.8 million from commercial research and \$49.8 million through cost-recovery agreements with utilities.

In the company's annual report, acting president Stan Hatcher predicts "major new Candu projects will be negotiated in the coming year for completion in the mid-1990s."

Hatcher says the international nuclear market in coming years will be dominated by smaller nuclear plants, and AECL has a jump of two to three years on the competition.

The corporation has invested heavily in its new 450-megawatt Candu 3, much smaller than most existing reactors, and is hoping that a first demonstration model will be built in either New Brunswick or Saskatchewan.

Hebert said he understands that New Brunswick is ready to go ahead with a second reactor, in addition to the one it operates at Point Lepreau, if adequate federal assistance can be obtained.

In the last New Brunswick election, Liberal Leader Frank McKenna left the impression that he was opposed

to nuclear power, but his position appears to have changed since then, said Hebert.

Hebert said New Brunswick is ready to pay as much toward a new reactor as it would cost to build a new coal-fired plant: about \$500 million. That would leave a tab of \$500 million to \$700 million for Ottawa.

The cost of the first Candu 3 would be \$1 billion to \$1.2 billion, although the cost would decline for subsequent models. A prototype in Canada is considered vital before the new reactor can be sold abroad.

A proposal by a private company to build a reactor in Saskatchewan would also require federal assistance, said Hebert. The idea has stirred controversy in the Prairies.

Internationally, South Korea has said it wants a Candu reactor. Turkey and Egypt are also considered potential customers.

FEDERAL REPUBLIC OF GERMANY

UK Paper on FRG Assistance for Libyan Missile

LD1510142289 London *THE SUNDAY*
CORRESPONDENT in English 15 Oct 89 p 3

[Report by correspondents Michael Farr in Bonn, and Alan Philips, with additional reporting by Ian Traynor in Vienna: "Missile Parts Sale Revealed"]

[Text] A Munich firm called Globe-Sat exported vital rocket valve components to Libya, according to West German investigators.

The components have made a major contribution to Colonel Mu'ammarr al-Qadhafi's scheme to build a ballistic missile armed with a conventional or chemical, or possibly even nuclear, warhead.

Libya has been trying to develop such a missile for years. As *THE SUNDAY CORRESPONDENT* revealed last week, West German engineers and companies are now playing a key role.

Heinz Stocker, the chief public prosecutor for the city of Munich, says he has concrete evidence that Globe-Sat exported valve parts, needed for guidance systems, without necessary permission.

A judge has issued a penal order requiring the firm's managing-director, Werner Ziegler, to pay a fine or go to jail.

Globe-Sat is contesting the order but the prosecutor is adamant: "With the evidence I have I am confident I can prove our case in court."

Mr Ziegler admits buying and selling valve guidance devices for civil uses, but denies exporting them—to Libya or anywhere else. "I don't even know what they are for," he says. "I am not an arms dealer."

Globe-Sat, set up in 1982, employs 12 people. It says its business involves oil exploration, satellite installations, and television relay in African and Arab countries, including Libya.

The crackdown against Globe-Sat is part of a world tightening of rules to stop Middle East countries like Libya, Iraq, and Egypt gaining access to missile technology and posing a threat to Europe's security. But many experts think it is too late.

Col al-Qadhafi's proposed missile would have a range of 300-450 miles and thus could strike across the Mediterranean at NATO's Sicilian air base.

His major problem has always been the development of an accurate guidance system.

Investigators are also looking at companies in Austria and Switzerland helping in the missile project, code-named Al-Fatih—the Conqueror.

Government investigators in Western Europe and America cite several links:

Technical Oil Production (TOP), set up in West Germany in 1984 by a Libyan named Abderrahim M. Badr, was used as a front company by Libya to procure guidance systems.

Mr Badr was banned from West Germany in 1987 for illegal exports, including components for Al-Fatih. He moved to Vienna but returned to Tripoli two months ago.

Fathi Zaki, an Egyptian-born Austrian citizen, organized a trip to Argentina last year, allegedly so that Al-Fatih project directors could seek Argentine expertise. Argentina is developing the Condor II, a rocket with a range of 600 miles, with Iraq and Egypt. Mr Zaki's Vienna company, Marketing, Trade and Industrial Development Co, is closed with an answering machine attached to the telephone. He worked from 1981-86 as consultant to Voest-Alpine, the state-owned firm under investigation over illegal arms sales to Iran and Iraq.

Several companies based in Lugano, Switzerland, have been training Libyans in missile technology and guidance systems. Such activities are not banned under Swiss law.

West German authorities have been forced to crack down on illegal sales of technology following revelations, initially denied by the Bonn government, that a company based in the Black Forest had helped set up a plant at al-Rabtah, Libya, capable of producing chemical weapons.

Bonn, under threat of U.S. sanctions against West German firms, is now keen to polish up its image.

Col al-Qadhafi has been trying to develop a missile for at least a decade. After the failure of experiments in 1979-81 involving the West German firm Otrag, he asked Soviet Union and China for long-range rockets.

He was apparently rebuffed, and is now engaged in the more laborious alternative of upgrading the Soviet-made SCUD, a crude rocket with a range of about 180 miles which is widely exported to the Middle East. Iraq, with the help of West German technicians, extended the range of the SCUD to 375 miles, firing about 180 of them on Teheran and other Iranian cities during the Gulf War.

Al-Qadhafi is reported to have offered Brazil, which is developing a medium-range missile, a \$2bn arms co-operation package if it lent expertise to a Libyan missile.

Rocket experts say U.S. pressure on developed countries, exerted through the Missile Technology Control Regime, is making it harder for latecomers like Libya to acquire rocket technology.

"No single company can give you everything you need now. But if you divide up the problems and get components from here and there, it can be done," said Israeli missile expert Ze'ev Eytan. "Al-Qadhafi has money and ambition."

Renewal of Brazilian Nuclear Treaty Opposed

90WP0005a Hamburg DER SPIEGEL in German
16 Oct 89 pp 149-153

[Unsigned article: "Brazil Must Test the Bomb"]

[Text] The federal government wants to renew the German-Brazilian nuclear treaty. But there are a great many indications that the Brazilians do not want to adhere to the condition agreed to in the past that German nuclear know-how must be used for peaceful purposes only. Do the Brazilians want nuclear weapons?

Water power alone, the federal chancellor recognized, does not help Brazil in its energy policy—too much of the Amazon region would be used up. Therefore, Helmut Kohl informed his research minister Heinz Riesenhuber, nuclear energy is indispensable.

With this finding, the decision was already made for Kohl even before the parliamentary summer recess: The German nuclear industry is to continue helping the Brazilians in the future in the development of their nuclear technology.

The decision was due because the treaty on German-Brazilian cooperation in nuclear energy expires on 18 November; if it is not terminated, it will be extended automatically for 5 years. The federal government would have liked to let the date pass unobtrusively. But at the end of September Social Democrats and Greens had formally asked the Kohl government to terminate the treaty concluded in 1975.

After Kohl's decision to renew the cooperation, the rest is merely camouflage. Bonn experts have been negotiating with the Brazilians for months about technical details and complex terms. After the latest general conference of the IAEA in Vienna, Senior Departmental Official Reinhard Loosch at the end of September even sacrificed a weekend for talks with the South Americans.

The purpose of all the efforts: The Bonn people want to show that they made sure that the nuclear technology will be used exclusively for peaceful purposes. But that is precisely what they will not accomplish—in this field Brazil is and will be a dubious partner.

The Latin American developing country apparently wants to have the know-how to build the nuclear bomb. It is in the process of fulfilling the wish of its military for a nuclear submarine. German deliveries of nuclear power plants and the resulting technology transfer, which according to the contract is to be used exclusively for peaceful purposes, have undoubtedly been helpful.

The nuclear partnership between the FRG and Brazil has always been based on the fairytale that a strict separation between peaceful and military use of nuclear energy is possible. It is proof of the fact that the prospect for a good business deal continues to inspire the determined desire of the Bonn politicians to believe in the good in people.

According to the 1975 treaty, German industry, supported by the state nuclear research institutes, was supposed to provide the Brazilians with access to the entire fuel cycle. This includes:

- delivery of 8 light-water reactors with a capacity of 1300 megawatt each;
- prospecting, mining, and commercial utilization of Brazilian natural uranium;
- building a plant for "heavy components" for reactor building, such as pressure vessels or steam generators;
- building and operation of a uranium enrichment plant;
- building a pilot reprocessing plant.

This peaceful nuclear armament was supposed to yield sales amounting to DM 12 billion (at 1975 prices) to German industry. In a "background paper" for Minister Riesenhuber the latter's staff on 20 May 1988 described in plain words what remains of the grandiose project—virtually nothing.

"The delay in the nuclear power plant program," according to Riesenhuber's staff, "is more than 10 years." Of the 8 planned nuclear reactors only one, Angra II, has been started. It is an open question when it will be completed; the Brazilians mention 1994. Thus far Angra III is only a hole in the ground.

Angra I, Brazil's thus far only completed nuclear power plant, was not built by the Germans. It is a product of Westinghouse, the U.S. company.

The other nuclear power program has been suspended for the time being. No one has any interest any longer in the production of natural uranium in view of the declining world market prices. Only 40 percent of the capacity of the finished heavy components plant is utilized; the fuel element plant has already produced, "but has been shut down for lack of orders."

The largely completed enrichment plant is very controversial. All plans for reprocessing have been postponed "indefinitely."

But it is not only the industrial disaster that makes collaboration with Brazil an embarrassing matter. Above all there is doubt in the intention of the partner to use the German assistance only for peaceful purposes.

The Brazilians refuse to sign the Nuclear Nonproliferation Treaty. Brazil did sign a pact on a Latin American nuclear-free zone but has not put it into effect to this day.

There were doubts as early as 1975. The Bonn politicians and their industry clients at that time absolutely wanted the nuclear business but did not want to look like unscrupulous profiteers. Therefore the customer had to accept a stipulation at that time: None of the "sensitive parts" of the fuel cycle and the "relevant technical knowledge" may be used militarily. The Brazilians were to grant access to the IAEA inspectors in Vienna as if they had signed the nonproliferation treaty.

The concerns expressed by the experts of the Foreign Office as early as 1975, before conclusion of the treaty, soon proved to be justified. The former Brazilian navy minister, Maximiano Fonseca in 1987 stated to the EVANGELISCHE PRESSEDIENST (Protestant Press Service) in 1987 with brutal candor that Brazil made the expensive deals with the Germans only to get hold of the technology which others, such as, e.g., Canada, had refused. Fonseca: "Brazil must test a nuclear bomb."

All along there were rumors that, parallel to the internationally monitored cooperation with Bonn, Brazil was pursuing a completely unsupervised nuclear development of its own. In 1987, the Brazilian president, Jose Sarney, confirmed that his country has the centrifuge technology for uranium enrichment, the key technology for the production of weapons-grade uranium. The technology was developed independently of the cooperation with the FRG, by Brazil on its own, the president said.

The Federal Intelligence Service informed the FRG government on 9 February 1987: "The parallel program is clearly directed toward military objectives." This did not prevent government spokesman Johnny Klein from dismissing as "nonsense" just a few weeks earlier all reports on the nuclear bomb ambition of the nuclear threshold country.

At least one thing is crystal clear in Brazil's behavior: The country tries to block as much as possible the international controls promised in the treaty.

According to the German-Brazilian treaty the FRG government reports to the Vienna nuclear authority each important component of nuclear technology, e.g., the main coolant pipes of a nuclear reactor, as soon as it leaves the country. Once the part has arrived in the country of destination, Brazil should report arrival and whereabouts to Vienna; the inspectors theoretically

would then be able to convince themselves at any time whether the sensitive import is used for peaceful purposes.

The "notifications" from Bonn in past years have always arrived punctually in Vienna. But Brasilia reported only slowly, in many cases not at all.

In most cases, the Brazilians talked their way out of it by saying that much of what Bonn had reported to Vienna was freely available technology and thus does not fall under the control regime. "A main coolant pipe system," according to a Bonn negotiator, "that is for them apparently only a system of bent pipes."

The same dispute also occurs on the topic of "relevant technical information." Some of the things that Bonn classifies as subject to reporting, is considered by the Brazilians as unclassified knowledge also obtainable elsewhere.

But now that the deadline of 18 November nears, the Bonn experts reported that they had reached agreement with the Brazilians to a large extent. But the agreement is not worth much. It is important to the Brazilians to keep the inspectors out of their "parallel program." Their main interest is devoted to this program.

In the meantime Riesenhuber's staff has also called this fact "alarming." While the German-Brazilian project is barely alive for lack of money, the Riesenhuber staff told their boss that the uncontrolled parallel program is amazingly "well equipped."

The "top personnel for the most part trained in Germany" left the controlled joint sector for the better remunerated area. There they can build bombs and submarine reactors without international supervision with the special knowledge acquired in Juelich or Karlsruhe.

Conclusion of the staff: "Because of the parallel program there is objectively reason for concern as well as subjectively the danger of an international loss of confidence with respect to the exclusively peaceful character of the German-Brazilian cooperation."

In the meantime the Brazilians not only want to obtain information. They also tried to transfer German nuclear equipment from the controlled area to their second, secret nuclear empire.

Thus the FRG firms Steag and Interatom together with the Brazilian state firm Nuclebras built an enrichment plant according to the separation nozzle process. This technology for fuel element production can also be misused for the production of weapons-grade material.

Therefore 2 conditions were attached to the export permit for the technical facilities: Placement under the Vienna controls and employment of a German technical director with sufficient power that misuse of the enrichment plant should be impossible without his knowledge.

On 31 August 1988 Brazilian State President Sarney decreed a reorganization of his nuclear industry. The joint enrichment enterprise Nuclei was to be liquidated under this reorganization and be transferred to a new state company. Controls would hardly have been possible.

Bonn was alarmed, but especially because the German business firms asked for reimbursement of their invested 30 million from the federal treasury. That was too embarrassing to Economics Minister Haussmann and his colleague Riesenhuber. At the end of September in Vienna their officials, after months of arguing, wrested the concession from the Brazilians to postpone the liquidation of Nuclei and to execute it later only in accordance with currently valid treaties. At the same time the partners had to promise to retain the position of the German technical director with all control powers.

The thrust by the Brazilians that has now been warded off can be followed by another at any time. In final analysis Bonn has no possibility to prevail in this matter. Haussmann's experts also noticed that when they proposed threatening Brazil in the negotiations with a stop of the enrichment plant and with the permanent refusal of the export licenses held up since August.

The threat, Steag and Interatom noted in a "fact paper," is only an "instrument with limited effect." The plant has been 99 percent assembled, the function tests have been largely completed: The Brazilians can "probably begin operation" of the enrichment plant "without German support."

Employees of Major Companies Said Involved in Transfers

51003039 West Berlin *DIE TAGESZEITUNG* in German 16 Sep 89 p 4

[Article by Thomas Scheuer: "Moonlighting in the Nuclear Black Market"]

[Text] Berlin (taz)—Nuclear technology experts from major FRG companies and institutes in the nuclear field have let themselves be recruited by the crooked Gelnhausen company, NTG [New Technologies, Ltd], for its illegal transactions with Pakistan and thus added to their modest salaries. NTG also used its U.S. subsidiary to smuggle additional know-how from the U.S. to Pakistan, India and South Africa. The Hanau public prosecutor's office, which is investigating NTG because of illegal nuclear exports, presented these new facts on Thursday afternoon in Bonn to the Atomic Investigation Committee of the Bundestag in a closed session. The public prosecutors stated that the investigation would soon be completed. The committee members thus expect an indictment in the near future.

NTG recruited about 8 to 9 highly qualified nuclear scientists from the companies, Metallgesellschaft and Degussa, and from the Juelich Nuclear Research Facility, the Karlsruhe Nuclear Research Center and the Darmstadt Society for Heavy Ion Research, in order to

obtain the necessary know-how for its illegal transfers of sensitive military nuclear technology. For example, one employee of Metallgesellschaft, which is located in Frankfurt, earned about DM50,000-60,000 for his moonlighting for NTG. Equipment and material were in part shipped to Pakistan by means of a dummy company set, with the initials MVG, set up in Switzerland. In this manner the illegal transfers could be declared on paper as exports to Switzerland. The NTG representatives in Switzerland had the MVG company set up by a Degussa employee, who had provided important contacts with the Pakistani Atomic Energy Commission, and by an employee of the Hamburg company, Rieckermann. The latter company came to the attention of the investigators when its name was discovered on bank receipts which were seized at the Frankfurt branch of the Pakistani state bank.

The Gelnhausen black marketeers acquired highly sensitive know-how in the field of acceleration technology from the U.S., where they founded the company, Scientific International (SI), which participated in the bidding for the institute and laboratory constructions projects of prominent American companies and research centers. By means of the bidding documents, SI acquired sensitive blueprints, which were then sold by NTG to the atomic scientists of Pakistan, India and South Africa.

In conjunction with the Transnuclear (TN) scandal, investigators discovered another private account of an important TN manager, deposited in a Swiss bank with a balance of approximately 700,000 Swiss francs. They money had been paid into the account in a series of cash deposits in Belgian francs. It is for this reason assumed that this sum corresponds to the extremely exaggerated payments which TN made to the Belgian nuclear waste disposal company, Smet Jet, for relatively minor services. Smet Jet workers had unloaded TN nuclear waste containers at the Belgian nuclear research center in Mol.

Documents on Nuclear Scandal Leaked

Soviet Involvement Alleged

90WP0003a West Berlin DIE TAGESZEITUNG in German 7 Oct 89 p 1

[Article datelined Berlin (taz): "USSR Circumvents Nuclear Weapons Nonproliferation Treaty"]

[Text] An up until now secret investigation report of the FRG Customs Investigation Office and documents of the International Atomic Energy Agency [IAEA] in Vienna prove that the USSR has for years been violating the Nuclear Non-Proliferation Treaty [NPT] for the benefit of its ally India. The means to this end and willing instrument in this dangerous business: the firm of Alfred Hempel, the nuclear dealer who died this past August.

The bomb deals were accepted by the FRG control authorities and, at least until 1986, also by the responsible Swiss control authorities. Despite massive urging by the United States the Economics Ministry in Bonn

refused to take action against Hempel. The reason was both trite and false: The deals of the Hempel AG allegedly never passed through FRG territory. With this protection Hempel for years handled the transportation of heavy water, with which the bomb material plutonium can be directly produced, from the USSR to India.

The customs investigative office was not brought into the matter until last year as a result of pressure from the Bonn nuclear investigating committee. The report (reference No. AB 555/88—classified CONFIDENTIAL Bp Z 602 VS—official secret) has been in the hands of the supervising ministries since January 1989.

Heavy Water Transferred

90WP0003b West Berlin DIE TAGESZEITUNG in German 7 Oct 89 pp 14-15

[Article by Thomas Scheuer: "How the Heavy Water for the Bomb Reached Bombay"; first paragraph is DIE TAGESZEITUNG (TAZ) introduction]

[Text] It looks like tapwater, is really just as harmless and is nonetheless a delicate material: Heavy water, chemically D₂O—deuterium oxide. As a "strategic component" in the production of plutonium, international trade in D₂O is subject to severe restrictions. Its delicate environment again is financially extremely attractive. In the radiating black market roaring business transactions are being conducted with the highly sensitive liquid. A Duesseldorf consortium of companies acted as launderer for heavy water for about 15 years. It operated—contrary to the NPT regulations—under the eyes of the authorities here. But dirty laundry also accumulated in the most important supplier country, the Soviet Union. TAZ investigated.

The 2 Chinese marble lions, a present on the occasion of the 65th birthday of the boss which had guarded the secrets of the firm's principal place of business on Cecilienallee in Duesseldorf for the past 4 years, have disappeared. The widely ramified group of companies has been sold for the most part. The boss himself died in August. An insider in the FRG nuclear industry claims to have perceived a "sigh of relief" in the industry. Once again a scandal-ridden name has been eliminated from the tarnished radiating brotherhood. The name: Alfred Hempel.

But the many years of services of the Duesseldorf raw material dealer for almost half a dozen dictatorships hell-bent for nuclear weapons will continue to develop—also political—explosive force. Not only because the Hempel case will provide a thick chapter in the final report of the Bundestag committee on the nuclear scandal. Hempel's nuclear black market deals just as the numerous other export scandals uncovered in the wake of the Transnuclear affair will possibly have far-reaching consequences for the future of the NPT. Hempel's worldwide bomb deals in terms of continuity and extent is likely to surpass all nuclear black market cases that have come to light thus far. During more than 15 years his

widely ramified consortium of companies delivered sensitive nuclear goods to virtually all states which have refused to this day for good reason to ratify the NPT: Israel, Pakistan, India, South Africa, and Argentina. But the nastiest shock: The Hempel people at times operated under the eyes of FRG and Swiss authorities. Documents from the IAEA in Vienna and from the German customs investigative office, which are available to TAZ furthermore prove: Even offices of the USSR in their dealings with Hempel have consciously accepted the fact that the political aims of the NPT were being subverted.

The radiating deals of the Hempel group made international headlines when in the spring of last year the Norwegian newspaper *VERDENS GANG* exposed a dubious transfer from 1983: In December of that year Hempel had bought 15 tons of Heavy water (deuterium oxide = D_2O) from the Norsk Hydro company, allegedly for delivery to the FRC, but the material was then diverted to Basel and, together with an additional 4.7 tons from the USSR was shipped illegally via the United Arab Emirates to India. As early as 1986 the West German Broadcasting Company (WDR) exposed a similar deal: In July 1985 Hempel had ordered from the USSR 6 shipments of D_2O allegedly intended for various West European firms, had exchanged the shipping documents in Zurich, and smuggled the material also via Basel and the Emirates to Bombay. While the WDR report at the time did not create any big stir in the FRG, the revelations from Norway—public, media, and politicians had been sensitized by the Transnuklear scandal—the Duesseldorf smugglers came to the attention of the Bonn investigating committee.

Its investigations with many years delay caused the public prosecutor's office and also the customs investigative office in Duesseldorf to get going last fall. Prior to that they had insistently claimed lack of jurisdiction because Hempel had handled his questionable deals through foreign firms and in these deals the goods had never passed through the FRG economic area. Now they roused themselves into conducting a foreign trade and payments examination in the Hempel headquarters in Duesseldorf. And lo and behold: In at least 3 cases transports had indeed been routed through FRG territory.

Heavy Water to Cola

In addition to the respectable delivery to just as reputable customers, such as, for example, the Karlsruhe Nuclear Research Center or the Max Planck Institute in Garching, the Hempel group intensively devoted itself to so-called special transactions. The "Report on the Examination of the Firm of Alfred Hempel GmbH," completed in January 1989 by the Duesseldorf Customs Auditing Office (file Ab No. 555/88—Bp Z 602; CONFIDENTIAL CONTROL—official secret), makes it possible to guess the dimensions of these "special transactions" over the years: The auditors found that the Hempel GmbH during the audit period alone from "December 1983 to November 1987 delivered a total of

about 194.6 tons of heavy water, mostly of reactor-grade, virgin quality, with a total sales value of DM 127 million to India via the ORDA AG, Switzerland, and in the process made a profit of about DM 24 million."

Hempel and his wife had established the ORDA AG in 1981 in the Swiss tax haven Zug—as had been noted as early as 1982 in a British intelligence report—"to be able to operate from an uncontrolled zone where he would not be asked any embarrassing questions." At any rate the Duesseldorf customs auditors stated that "all deliveries of heavy water to India were channeled through the ORDA AG, Zug/Switzerland."

The business, the report continues, represented "undoubtedly a great risk" for ORDA, "since the market supply of heavy water without presentation of so-called end destination certification has become more and more difficult." In fact, according to the London Guidelines of 1977, a supplementary agreement to the NPT that went into effect in 1970, transactions involving heavy water, on account of its strategic importance, must be reported starting with a quantity of 1,000 kg. This is because heavy water acts as a moderator in a type of reactor in which the bomb material plutonium can be obtained directly from natural uranium, thus without the costly roundabout way of the technically complex enrichment process.

To keep the Duesseldorf parent company out of the deals, the auditors continued, the purchase in the PRC and the sale to India were channeled through ORDA. Pro forma "internal" purchase contracts were concluded between ORDA in Zug and the parent company in Duesseldorf. The fact that those involved were very well aware of the dubious nature of their deals was shown by the extensive telex communications between the accredited office of Hempel in Beijing and ORDA in Zug that fell into the hands of the customs officials in Duesseldorf's Cecilienallee. To keep the true character of the deals hidden, the heavy water was referred to in the telex communications as "Coca Cola."

Thirst for Hempel Water

After studying the voluminous bookkeeping of the firm the customs experts moreover reached the conclusion that ORDA probably did not record all heavy water deals in its books. Incidentally the Swiss tax people were probably also cheated. Thus the customs officials found in the Hempel books only documents on D_2O deals with India, but not with Argentina, Hempel's second most important customer. TAZ has shipping documents of the West Africa Airline (WAAL) from 1984—thus from the audit period—on ORDA's D_2O deliveries to Argentina. The 200 tons of D_2O for India, which the customs auditors reconstructed from Hempel's bookkeeping, thus are only part of the total Hempel activities with this material in the years from 1984 to 1988. To say nothing of the years before that!

A memo of the Federal Intelligence Service of December 1982 lists for the months of July to November 1982

alone several shipments to India (totaling 60 tons) and Argentina (10 tons). Experts estimate that Hempel illegally shipped close to 500 tons of D_2O to nuclear threshold countries and thus significantly contributed to their military nuclear programs.

His career on the black market for sensitive nuclear equipment can be traced back to the early seventies. In 1973 he obtained heavy water for illegal shipment to Israel for a Luxembourg firm (it already appears in the record with "Euratom" for diverting enriched uranium to Israel). Through his first Swiss cover firm, "Adero-Chemie" in Geneva, he delivered, no later than early 1975, heavy water and other components to archenemies Pakistan and India at the same time. The origin of the material at that time can hardly be determined any longer. But it is clear how the Pakistanis came to Hempel: By the highly official road through the German embassy in Islamabad! It is to that embassy that the bomb chemists of Dr. Khan, who have always been obsessed with things nuclear Made in Germany, turned with the question about heavy water dealers. The ambassador passed the request on to the experts of the Karlsruhe Nuclear Research Center, who recommended their principal supplier, Hempel.

But the competition in the hostile neighboring state India became Hempel's most important customer. Since the "peaceful nuclear explosion" in India in 1974, India's and Pakistan's nuclear scientists have been in a feverish race for the bomb. In addition to the enrichment of uranium developed in the meantime, both of them are backing natural uranium reactors requiring heavy water as neutron moderator. After the "peaceful" detonation of the Indian bomb, the former supplier Canada stopped all heavy water shipments. Soon India's nuclear engineers busied themselves on a heavy water production plant of their own. But it achieved in 1977/78 just about 14 tons instead of the required 300 tons a year. The Soviet Union quite officially did supply India's nuclear program with D_2O . But only for the plant which India had voluntarily placed under control by IAEA safeguards.

Other sources had to be tapped for the secret military nuclear projects. That is where Hempel came in. Experts are convinced that the start-up of the military heavy water reactor Kalpakkam near Madras in 1985 was made possible only by Hempel's shipments. A leak by which the valuable moderator liquid escaped had delayed its start-up. Hempel took care of replacements. The former Wehrmacht lieutenant has rendered truly outstanding service in connection with the bomb.

With the help of groups of Paris arms dealers Hempel had advanced to the position of supplier of the Argentine generals. He supplied their nuclear engineers, too, with heavy water, at times also with uranium. At any rate his offer comprised materials "for all stages of the fuel cycle." At that time the "brain merchant," as he liked to refer to himself, had just initiated new business contacts

to the Far East. As he did years before in the USSR, he cultivated the nuclear market as business pioneer in the PRC.

Contract With the Indians

Actually Hempel wanted to get strongly involved there in the waste disposal business and to have spent fuel elements from European nuclear reactors buried in the Gobi Desert. "Since the end of 1983," an official in the Ministry for Economics in a memorandum stated at that time, "negotiations have been going on between the China Nuclear Energy Industry Corporation and a German business consortium headed by the Hempel AG company." The ministry official bent on export at any price sensed that "the use of such a transaction for nuclear powerplants exported by German firms would be ...conceivable." In a flash the Laser-Nuclear company was established—together with Nukern (35 percent) and Transnuklear (10 percent). The majority share of 55 percent was held by the Duesseldorf brain merchant. But even a private audience with Minister Bangemann could not prevent financially stronger companies from squeezing Hempel out of the negotiations which are still being carried on at a slow pace. But in his line of business, according to a statement by a Nukern officer to TAZ, Hempel is indisputably regarded as "the inventor of the China business."

Hempel had more luck in China with his private brand D_2O : The China National Chemicals Import & Export Corporation and the Sinochem company for many years were Hempel's main reservoir for heavy water. But after Western diplomats and representatives of the IAEA had intervened in Beijing, the shipments were temporarily stopped in late summer 1984 and the firms were ready for further business transactions with Hempel only against presentation of official import certificates. Hempel was in a dilemma: Of course, he was unable to present the requested papers, on the other hand the Indians pressed for adherence to the contractual delivery commitments.

On 1 August 1983 the Duesseldorf group had concluded a basic agreement (No. dps/cpu/21 I-iii-d:) on the further long-term delivery of D_2O "from Europe to Bombay" with the "Directorate of Purchase and Stores" in Bombay. In an addendum Number II of 31 August 1983, a price of US\$ 310 per kilogram was agreed upon. The invoices in each case were sent to the "Finance and Account Officer" of the "Department of Atomic Energy."

To be able to meet delivery commitments to the Indian bomb builders an intricate transfer took place in December 1983 which brought about worldwide headlines for Hempel in the spring of 1988 and finally an invitation from the Bonn investigating committee. Hempel ordered 15 tons of D_2O from the Norwegian Hydro Norsk company which was allegedly intended for the research reactor in the Juelich Nuclear Research Center. With this false identification of the customer he

also fraudulently obtained the international import certificate from the Federal Office for Industry and Trade in Eschborn, a certificate on which the Norwegians had insisted. But when the charter aircraft of the West African Airline took off with the material for its flight No. KY 660 from Oslo airport, the pilot informed the tower of a change of its flight plan on short notice: Not Frankfurt, as originally reported, but Basel is the destination. Hempel GmbH, Duesseldorf, resold the goods by telephone to its own cover firm ORDA AG in Zug, Switzerland. On this 1 December a truck of the Soviet shipper "Sovtransavto" (license plate: MAS-75-31MKA) including trailer (license plate: 68-64 MB) also arrived in Basel. Its cargo: additional 4.7 tons of D₂O shipped by the "Izotop" firm in Kiev. This cargo was also loaded on the WAAL aircraft and the latter departed for Bombay via Dubai. Price of the shipment: US\$ 6,153,500.

Later on Hempel succeeded once again in obtaining material from China—apparently at a "premium price." Thus a travel expense report of the boss of 2 May 1985 revealed that he paid to his interlocutors of "Sinochem," the Beijing chemical firm, on 17 April 1985 the equivalent of DM 6,500 as bribes. As operating expenses he classified these bribes as "settlement of the heavy water shipments."

Trick With 990 Kilograms

As a long-term replacement of the PRC channels that were drying up, Hempel increasingly tapped Soviet heavy water sources starting in 1984. In the USSR he maintained exclusive contacts with its state trade firm "Tekhsnabeksport" (TSE) since the midseventies.

"The Old Man," as his staff called him, caught his biggest fish in 1978: An exclusive agency agreement with Tekhsnabeksport on uranium enrichment services in the USSR. The uranium for the fuel rods of 6 FRG nuclear reactors was last enriched in the USSR. With a commission volume of 200 million, Hempel annually collected half a million DM. "And that practically without any performance in return worth mentioning," an honest customs officer noted in his report, probably not without wistful thoughts.

The commission contract provided the former general merchandise merchant with a strategic position in the FRG nuclear community. In the past the ambitious West German nuclear community was largely dependent on the monopoly of the Americans for enrichment. Hempel manager Helmut Swyen called the agreement with the Americans an oppressive contract before the Bonn committee. Hempel's coup regarding commissions apparently gave wings to his fantasy, for in internal memos at that time he put on paper far-reaching plans on joint organizing of businesses and joint investments, e.g., with the Hanau Nukern. Essentially it was nothing more than pipedreams. The dream of creating uranium sources of his own in Namibia also came to naught: At any rate he had established the "Alfred Hempel Bergbau" and even 3 subsidiaries in Windhoek for this purpose.

While the shipments from China could be made relatively without any problems via the Dubai or Sharyah airports in the United Arab Emirates to India or Argentina, the transfer with Soviet material became considerably more difficult. The partners in Moscow placed greatest importance on not arousing the slightest suspicion of a violation of international regulations.

The 990 kg trick became the core of Hempel's cover technique: The amounts delivered from the USSR were broken up into partial shipments of 990 kg each. Thus they were below the reportable limit of one ton. The partial amounts allegedly were intended for different customers in Western Europe but were again assembled by devious paths at the Zurich-Kloten and Basel airports and then flown by charter aircraft via Dubai or Sharjah to Bombay. During transloading at the Zurich and Basel hubs, but the latest at the intermediate stop in the Emirates, the cargo, as it is stated in the customs report, was "neutralized and newly marked." In other words, the shipping documents were replaced and the markings of the containers were changed.

Detour via Liberia

After a tightening of the transit regulations for heavy water in Switzerland, starting in 1986 the Vienna and Amsterdam airports were used as central collecting and takeoff points for the 990 kg portions. Later on, perhaps starting in 1987, the shipments which became more and more risky, were stored in the West African coastal state Liberia and transacted through the two firms Velsona and Beryl in Monrovia as "trust transactions." Both firms appear to be dummy corporations established only for this purpose. At any rate no information can be obtained either through the commercial sections of several embassies or through the economics ministry in Monrovia (there is no commercial register in existence in Liberia) about these companies or their owners.

The last 3 shipments which Hempel was able to get out of China in the summer of 1987 were shipped via Monrovia. On that occasion the Chinese caught on that their German partners were passing the material on to hostile India and finally refused any further shipments. As penalty the Duesseldorf black marketers without any further ado held back 3 outstanding payments for goods already delivered—at any rate US\$ 666,092.30. Rightly they banked on the fact that the Chinese very probably would beware of appealing to the public arbitration agency agreed on in the contracts because of the politically explosive effect.

But the enormous fraudulent activity of the Hempel crew alone does not explain why the latter were able to pursue their black market activities to such an extent for almost 15 years. The black market activities were made possible and promoted by flagrant shortcomings in the international and national control system and the relentless export ideology of state agencies.

Switzerland Aware Since 1981

Of the states involved, Switzerland looks cleanest. After all it tightened up the transit regulation for D_2O after the disclosures about Hempel's deals. But the Swiss authorities took a good deal of time with their "Lex Hempel," as an official in Bern referred to the changed section in the regulations. The Swiss act as if they did not come across the Hempel problem until 1986. But as early as 1981, i.e. in the year ORDA, the dummy firm, was established, Bonn agencies passed on to their colleagues in Bern shipping documents of a dubious D_2O transfer from China via Paris to Argentina. (The Germans had received the documents from the French secret service.) As early as August 1981 Bonn informed Bern about an especially sensitive Hempel shipment: Six tons of uranium had been shipped illegally from China to South Africa through ORDA. The German embassy reported to Bonn that U.S. diplomats had also intervened in Bern and the Swiss would "speak with ORDA and point out to it the consequences of its action. But this has to be done very cautiously." It remains a secret why Swiss government agencies believed they could approach ORDA only "very cautiously" (actually the company was never seriously examined) remains their secret. At any rate, in the coming years to start with ORDA did not feel any consequences.

The Swiss lawyers whom the Hempel couple had picked as directors of their dummy firm ORDA for the commercial register moreover did not content themselves at all with the role of passive front men. When German customs investigators with an order of attachment of the Duesseldorf municipal court in hand last year stood in front of the lawyer of the Transservice shipping company ready for action, the wanted shipping documents had disappeared. At the urging of the ORDA people in Zug, the lawyer had sent the documents to Switzerland. According to the report by the officers, "What was involved here were probative documents for the German and Norwegian judicial authorities." Thus ORDA employees actively obstructed the investigations of foreign judicial authorities.

The competent ministries in Bonn were very well informed about Hempel's worldwide activities. As early as December 1983, Duesseldorf customs investigators reported that "the references to country of origin were removed in Sharjah from the containers" in the case of D_2O shipments via Sharjah. U.S. diplomats provided up-to-date findings of the intelligence service about Hempel's worldwide machinations to their Bonn colleagues and urged that measures be taken. One example: In December 1986 U.S. agencies reported to the Bonn authorities ("to your attention") that Hempel is now trying to get 17 tons of D_2O , split in quantities of less than 1,000 kg obviously with the false claim of various European customers, the usual Hempel pattern. Apparently the maneuver was controlled from the FRG by Hempel people "to circumvent the safeguards policy of

another country. "It would be a violation of the nonproliferation policy," the Americans warned, "if this scheme were successful." Reaction from Bonn: none.

Apparently the innumerable U.S. demarches caused arguments in Bonn between the Foreign Ministry, which repeatedly insisted on the principles of nonproliferation, and the Economics Ministry, which then in each case started to sing the national anthem "Export, export above all else." Thus in the summer of 1981 the Foreign Office in vain several times asked for information and actions of the Economics Ministry after the Beijing embassy had sent a cable to Bonn to the effect that Hempel ordered weakly enriched uranium in China for customers in the FRG. Of course, that was the usual Hempel subterfuge: The material—it was already in Hong Kong—was intended for the military nuclear agencies in Argentina and South Africa.

Bonn Pretends Not To Hear

Washington, too, was already alerted by the intelligence service, transmitted to Bonn "the serious concern of the U.S. Government" over the deal and urgently asked for "the support of the FRG to prevent the shipment of nuclear material to South Africa." In tough negotiations Americans and French at that time tried to induce the South Africans to place their nuclear program under IAEA supervision. The urgent South African need for slightly enriched uranium for the 2 Koeberg reactors near Capetown served them as a "lever." Uranium shipments by any other countries in this situation, Washington and Paris feared, would "seriously undermine" the chances "of forcing the South Africans to submit to IAEA control." The Americans considered the matter as so serious that Alexander Haig, the former secretary of state and former NATO supreme commander, brought up the subject during his state visit in Beijing.

But Bonn saw no reason for any measures and was satisfied with the statement of the Hempel management that it had absolutely no nuclear links to China. Which was simply a lie. The "German assistance" requested did not materialize and soon thereafter the Koeberg twin nuclear reactor at the Cape went on line—without IAEA control.

Transit Through FRG

Hempel's goods in their complex channels never passed through the FRG economic territory, that is the explanation of the German judicial system for its zero actions, therefore FRG laws are not involved. In reality, the authorities did not want to know anything about that. Only in response to pressure from the Bonn investigating committee did customs and justice agencies trouble themselves last fall to go to Hempel's bookkeeping department. And lo and behold: Some heavy water shipments from the USSR during their detours to the hub Switzerland passed through the FRG by truck. Thus in December 1984 5 tons of D_2O were shipped by truck from Kiev in transit through the FRG to Zurich. From there it was shipped to Bombay. Half a year later, in

August 1985, a partial shipment landed at the Frankfurt airport instead of in Zurich—the manager of the state shipping company "Sovtransavto" had mixed up the destinations. Without further ado the material was temporarily stored in Frankfurt and shipped directly to Bombay by an Air India charter plane on 13 September 1985. In December 1985 a "Sovtransavto" driver with 3.9 tons by mistake again ended up in Frankfurt. This time the cargo was routed to Amsterdam by truck as a precautionary measure and picked up there by Air India. Therefore Hempel not only expertly took advantage of the loopholes of the trade and payments law but directly violated legal regulations. But owing to the weak legal situation, those responsible are threatened at worst with a fine—which they will be able to pay easily after the "bomb deals" worth many millions.

By the way, the peculiar relationship of FRG export control officials with the Duesseldorf black marketeers is illuminated by a little event: In July 1987, when the revision of the COCOM list was under discussion at the Federal Office for Foreign Trade and Payments in Eschborn, the Hempel principal company officers Swyen and Schmidt were invited as experts for deuterium products. After all, their firm is the "principal importer of such goods from the entire East Bloc." An official in the Economics Ministry once advised against a foreign trade and payments audit of Hempel because of the latter's exclusive East contacts.

There remains the question whether Hempel's ultimate customers could have remained concealed from the Soviet suppliers. As country of origin the USSR was the party responsible for compliance with the "end use" regulations. In a conversation with a representative of the Foreign Office in 1986, Soviet ambassador Yelizarev gave the assurance that his country "strictly fulfills its international obligations according to the treaty on non-proliferation of nuclear weapons and the London agreement on the principles for nuclear exports." In misjudging the FRG conditions the Soviet diplomat even demanded from the Bonn official to take "necessary measures to stop the underhanded attempts of some circles to cast a shadow over the policy of the USSR in the field of nuclear exports." In other words the press is to be muzzled.

USSR Dealt With India

But the shadow cannot be obliterated: It must have been evident to the market-wise functionaries of Tekhsnabeksport that the firms given again and again as customers had no use for D_2O , by no means in those quantities. But above all to supply respectable firms and institutes in the EC area, the bureaucratically costly 990 kg dodge would have been unnecessary. Thus a growing suspicion arose that the USSR knowingly permitted the strategic substance heavy water to go to its ally India through Hempel's business channels, a substance which officially it could not supply without violating international regulations.

Finally Swiss government agencies also arrived at this assessment and informed their German colleagues of it. In a coded message the German embassy in Bern sent a cable to the Foreign Office on 14 February 1986: "The Swiss suspect that the Soviet Union is now trying to smuggle sizable quantities of heavy water through firms in Switzerland, the FRG, and The Netherlands to India." In Bern it is assumed "that the Soviet Union, in addition to its nuclear relations with India, is looking for ways to supply India, while circumventing the London Guidelines and by disguising the delivery routes, with sizable quantities of heavy water for the Indian nuclear facilities that are not under IAEA control. A key role is said to be assigned to the affiliates (...) belonging to the Hempel group."

The author of the Duesseldorf customs report of January 1989 also reaches the conclusion: "With the division of the contract amounts of less than 1,000 kg net and the corresponding handling, the Soviet supplier Tekhsnabeksport has obviously evaded international agreements. In my opinion, the Soviet supplier knew that India was the country of destination."

The political background of this Soviet practice towards its ally India is repeatedly documented in the internal files of the IAEA in Vienna. Thus in 1976/77 IAEA delegations negotiated with the Indians about putting the entire Indian fuel cycle under the control system of the IAEA safeguards. When a high-level IAEA delegation traveled to Bombay in May 1977, the Indian negotiators had already backtracked. The Indians had signaled that at best they were prepared for negotiations on placing the two reactors Rajasthan I and II under IAEA control. An IAEA envoy jotted the following down: "According to my impression there is no doubt that in this connection Soviet influence was decisive."

There is a time limit on the NPT that went into effect in 1970. Unless a new treaty is concluded, it will expire in 1995. The prospects for such a treaty look bad. At a review conference in the coming year, the industrial countries, above all the FRG, will have to accept being criticized about their export scandals by those Third World countries which have always castigated the NPT as being discriminatory. Even the previous review conference in Geneva in 1985 had achieved a joint final communique after a 3-week marathon session only with the greatest difficulty.

The recently exposed scandals concerning nuclear exports show how massively and persistently the NPT was contravened despite protestations to the contrary by those in power, especially by German companies with the German authorities turning blind eyes on them. Actually Hempel and the other black marketeers have only carried the logic of the FRG export philosophy to extremes. It almost seems as if the German nuclear mafia compensates for the perhaps unconsciously painful renunciation of its own bomb by performing even more eager dirty work for fanatical dictators who are craving for the instrument of horror. At any rate they

have prepared the path to the nuclear bomb for them. As if there were no other way in the world to make millions.

FRANCE

Government Reaffirms Civil Nuclear Power Policy

AU1910083089 Paris AFP in English
0119 GMT 19 Oct 89

[Text] The French Government has reaffirmed the broad outlines of its nuclear policy in the civilian field and has decided on simplification of the existing system.

The simplification is based on the Atomic Energy Commission (CEA) and a strengthening of safety at nuclear installations.

A communique issued Wednesday after a Cabinet meeting said that "France must make the best possible use of its nuclear electricity equipment, and maintain the safety and quality of the installations.

It said that France must also "prepare the future in order to renew" the equipment with an eye on the 21st century, and must "keep control of the entire nuclear cycle" (from uranium mining to reprocessing, and including storage of nuclear waste).

In particular, the government wants better (?cooperation)—starting in mid-1990—between the Atomic Energy Commission, the designer of reactors and a research agency, the COGEMA (Nuclear Materials Company), Eurodif (the plant for production of enriched uranium), Framatome (the major French reactor builder), and Electricity de France, which operates the 55 reactors in service in France.

Those reactors supply 72 percent of all electricity produced in France, and make it possible to export some electricity to Switzerland, West Germany and other countries.

Before the end of next June, CEA is to submit a "medium-term research plan for the whole nuclear sector, with forecasts of the various partners' financial participation".

The Cabinet's communique stressed that safety of nuclear installations "remains an absolute priority".

SWEDEN

Ruling Party Considers Future of Nuclear Power

Long-Term Policy Vague

36500115z Stockholm DAGENS NYHETER in Swedish
19 Aug 89 p 12

[Article by Ake Ekdahl: "Difficult To Combine All Energy Resolutions"]

[Text] The rift within the Social Democratic Party over nuclear power remains. The party's future-studies group did not manage to smooth over the internal differences

on how nuclear power should be used and it took no position on future solutions. The group simply pointed out that the conflict exists and decided to wait on the outcome of ongoing studies, among other things, on the electricity needs of industry.

Phasing out nuclear power is extremely difficult, the Social Democrats admit. They are hoping for a compromise solution later. The decision has been postponed yet another year.

"The need to conserve energy and to increase the cost of electricity means that the basic industries that require the most electricity cannot meet their needs. We believe we cannot avoid a very difficult choice in which one or more past resolutions by parliament will have to be set aside," the group said.

The three resolutions to which they refer are the decisions to begin phasing out nuclear power in 1995, not to increase carbon dioxide emissions, and not to build dams on rivers where there are none at present.

"We are not calling for any of these decisions to be reexamined. We are simply stating that it will be difficult to reconcile the three resolutions. As LO [Federation of Trade Unions] chairman, I still believe that additional dams would be preferable, but as far as I can see there is not a parliamentary majority in favor of this today. I can also see postponing the phaseout of nuclear power, as proposed by the Liberal Party. But we cannot be locked into a particular position today," Stig Malm said.

In saying this, he contradicted Energy Minister Birgitta Dahl who, as recently as Friday, guaranteed in DAGENS NYHETER that all three goals would be achieved. Anything else would be dishonest, she said.

As a thought experiment, Malm could conceive of an early phaseout of nuclear power, but only if the entire country would refrain from driving automobiles.

"We must openly admit that it will be extremely expensive to phase out nuclear power," Malm added.

The future-studies group stated that the phaseout of nuclear power could cause unemployment problems in Bergslagen and northern Sweden.

Compromises

The alternative is to allow heavy industries to go under. The group has not yet calculated the effects of this. Another alternative would be to subsidize industrial electricity consumption, but that would be a major deviation in principle from the remainder of the energy strategy and it would be directly opposed to the energy conservation program. The only remaining possibilities are compromises among virtually incompatible goals. This would require information at an early stage on how the loss of nuclear power could be confronted, they said.

The group is quite specific on one point. The cost of electricity must be based on the cost of expanding electric power generation. Profits coming from the older,

less expensive hydroelectric plants will go to the state, which will then use them for industrial subsidies in needy regions.

Electricity Prices Up

"Phasing out nuclear power will mean that prices in Sweden will go up somewhat earlier than in other countries. It is difficult to estimate how many companies will be eliminated," said the group, which also avoided the question of costs for private homes heated by electricity.

"It is inconsistent to demand the phaseout of nuclear power and, at the same time, protest against higher electricity prices. We must see that all this is related and we must then take responsibility for the overall picture. The burden caused by phasing out nuclear power must be distributed fairly," the group wrote.

The future study also says that natural gas cannot be the main replacement for nuclear power in the long run. Consequently, there are only two alternatives: using energy more efficiently and conserving it or reducing carbon dioxide emissions from other sources, primarily from automobile traffic. That would allow us to burn a certain amount of fossil fuels for electricity production.

Union Leaders Critical

36500115z Stockholm DAGENS NYHETER in Swedish
19 Aug 89 p 12

[Article by Kerstin Sedvallson: "Show Us We Are Wrong"]

[Text] Uno Ekberg, chairman of the Factory Workers Union, would be happy to follow the government's lead and conform to Birgitta Dahl's policy on nuclear power. He will do so if it turns out that he and his trade union colleagues at the Metal Workers, Paper Workers, and Miners Unions are wrong in demanding that the phaseout of nuclear power be postponed.

"If we are given detailed information on what the energy alternatives will be, instead of these general statements, then I will have no objections. We simply want clarity, so that people will know what the government's phaseout of nuclear power will mean," Uno Ekberg told DAGENS NYHETER following all the commotion that was stirred up within the labor movement by the four trade union leaders' article in DAGENS NYHETER.

According to Uno Ekberg, it is not only the trade unions that are asking what the alternative energy sources will look like once nuclear power is phased out in 1995 and 1996.

Difficult To Plan

"Companies cannot make long-range plans. The most recent example is MoDo, which wanted to build a new chemical plant. It was to be located in Sweden, but it was

moved to Norway because, according to the company, it could not make long-range energy plans," Uno Ekberg said.

The trade unions are concerned over the future of companies that consume large quantities of electricity and are dependent on electricity as a raw material in their production.

Arne Angelof, vice chairman of the Metal Workers Union, gave a brief example.

"Down in Vastergotland on Vargon there are 400 people working exclusively with hard metals, a process that consumes a great deal of electricity. Last year the company had profits of 85 million kronor. For every kilowatt-hour costing just 1 ore more, the annual cost increases by 8 million kronor. Say, for example, that this cost doubles. In this case, the company would lose all its profits and more. Then these old boys will be without work."

Who Bears the Burden

The metal workers wonder who will bear the burden of phasing out nuclear power.

"We did not intend for the burden to be borne by those who work in electricity-intensive industries and those who live in their electrically heated houses," Arne Angelof said.

Who then will bear the burden? We must do this together, according to Arne Angelof.

The higher energy prices must not fall on industry, either. But then others will have to pay. But who?

"It must be you and I who pay," Arne Angelof said.

TURKEY

Studies Under Way on Nuclear Reactor Construction

TA1610164989 Ankara ANATOLIA in English
1535 GMT 16 Oct 89

[Text] Izmir (A.A.)—Turkey will complete the construction of a nuclear reactor by the end of 1997 for test reasons for the future employment of nuclear energy, a senior official said on Monday.

Atilla Ozmen, the director of the Turkish Atomic Energy Association (TAED), told A.A. that the employment of nuclear energy would inevitably be necessary to meet Turkey's future energy requirements.

Turkey currently uses coal and oil based power stations and hydroelectric dams to produce electricity.

Ozmen said preliminary studies on the construction of the test nuclear reactor, which is expected to cost 50 million U.S. dollars at today's prices, have reached a project preparation stage with the efforts of a TAED group.

The exact location of the reactor will be decided after the completion of the current studies, he added.

END OF

FICHE

DATE FILMED

27 Nov. 1989